Peritoneal dialysis: one unit’s response to improving outcome and technique survival

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Abstract
Home therapies, including peritoneal dialysis (PD), empower self-management and enhance improved outcomes. Renal clinicians need to be promoting and encouraging home therapies, while providing the best possible education and support to ensure compliance and maintenance of modality of choice. Patients should be set up to succeed, with proactive management and ongoing individualised education from clinicians.

A small Australian PD service identified several gaps in the current management of PD requiring a review of unit protocols including patient selection and liaison with chronic kidney disease educator; aligned with current International Society of Peritoneal Dialysis (ISPD) guidelines; technique failure; patient education; and regular monitoring of infection rates. The unit sought to enhance PD outcomes through the implementation of strategic changes.

These changes included: revision of PD protocols, discussions with microbiologists to reduce incidence of culture-negative peritonitis, improved communication between PD nurses and “on-call” nurses, state-wide networking, and the development of specific flow charts. The adoption of improved data collection methods and tracking of peritonitis rates further enhances outcomes by aiding the establishment of the root cause of infection, which, in turn, improves outcomes by reducing the risk of repeat episodes through focused education and prevention methods.

Proactive management and ongoing individualised education, together with implemented changes as described, will result in better individual compliance, with increased support and, therefore, improved PD outcomes and technique survival time.

Keywords
Peritoneal dialysis, peritonitis, self-management.

Introduction
Home-based renal replacement therapies, including peritoneal dialysis (PD), are more cost-effective than in-centre treatments and pose numerous benefits to patients, including: flexibility and convenience, increased ability to work, less hospitalisation, greater independence and control over treatment, and improved outcomes overall (Harwood & Leitch, 2006; Tokgoz, 2009). Some patients requiring dialysis in Australia elect home-based therapies as a first preference (Harwood & Leitch, 2006). Thirty per cent of all Australian dialysis-dependent patients dialyse at home, although recent Australian trends reveal a reduction in home-based renal replacement therapies, particularly PD which decreased by 6% in 2010 (Briggs et al., 2011; Brown et al., 2011; Harwood & Leitch, 2006). PD requires extensive responsibility from recipients and their care givers. Compliance and adherence to prescribed treatment and self-care regimens are essential to maintain technique viability, prevent complications or permanent transfer to haemodialysis (HD). Therefore, nephrology health professionals need to actively support PD and develop strategies to enhance technique survival.

Self-management
Research indicates PD patients take an active role in performing their dialysis (Curtin et al., 2004). Generally they are more motivated and involved in their care, take greater responsibility for their health and are more educated about their illness and treatment, resulting in improved outcomes (McLaughlin et al., 2008). PD patients and their care givers should be empowered to effectively self-manage, maintain independence and make decisions regarding treatment. In this context, self-management describes an ability to appropriately recognise and control signs and symptoms of illness, adhere to treatment, and adopt necessary life-styles changes (Curtin et al., 2005; Su et al., 2009). It also requires an ability to cope with the physical and psychosocial consequences characteristic of living with a chronic condition, or the capacity to control or manage symptoms, to prevent complications and minimise intrusion. Without adequate support and ongoing education, managing a daily dialysis schedule may become burdensome, resulting in poor outcome and technique failure (McCarthy et al., 2010). Therefore, PD patients and their care givers or significant
others, must be provided with the best possible education and support to ensure adherence, dialysis adequacy, and reduction of the incidence of technique failure. Patients should be set up to succeed with proactive, patient-centred management and ongoing individualised education. The PD nurse and patient must become partners in care.

**Technique failure**

The 2010 report of the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA) reveals over one-quarter of PD patients permanently transferred to in-centre HD (Brown et al., 2011). Technique failure is defined as any PD-related complication which leads to permanent cessation of therapy. Between 1 January 2008 and 31 December 2009, the most commonly reported cause of technique failure in Australia, almost half (43%), and New Zealand, one-third (34%), was social reasons. Approximately one-quarter of all PD technique failures in Australia (27%) and New Zealand (27%) during this same period, was attributed to infective processes, peritonitis (25%), technical failure represented less than one-third in both Australia (16%) and New Zealand (14%), as did dialysis failure, in Australia (14%) and New Zealand (25%) (Brown et al., 2011). During 2009 a small Australian PD unit (hereafter referred to as the unit) transferred PD patients to HD. The unit had three (from a total of 25) or 12% of PD patients permanently transferred to HD, due to peritonitis and one for social reasons. A fourth patient temporarily transferred. It is imperative that PD nurses understand why these individuals revert to HD and consider strategies to prevent this occurring, or at least reduce incidence of transfer.

**Current issues**

A recent, topical paper highlighted the necessity to review PD practice in view of poor technique survival rates in Australia and New Zealand when compared to other parts of the world (Jose et al., 2011). Review of this paper resulted in assessment of current practices within the unit in relationship to current International Society for Peritoneal Dialysis (ISPD) guidelines. Consequently, specific strategies designed to improve technique survival rate were developed (Jose et al., 2011; Li et al., 2010). Jose et al. (2011) provided practical suggestions to improve technique survival and outcome in PD patients. Five specific areas were detailed by Jose et al. (2011) as follows:

- Patient selection.
- Prophylaxis and timely treatment of infectious complications.
- Investigation of social causes of technique failure.
- Patient education and continuous support.
- Clinical governance and professional standards.

**Patient selection**

Jose et al. (2011) highlighted several points in regard to PD patient selection including: Encouraging patient choice, consideration of individuals <60 years without comorbidity and the selection of motivated patients with support. The unit did not review all these aspects due to staff and other resource constraints.

Individuals with chronic kidney disease (CKD) ideally should be given information and education regarding end-stage kidney disease (ESKD), and be provided with the opportunity to openly discuss treatment options including conservative management and renal replacement therapies. Benefits and disadvantages should be considered with patients’ given opportunity to elect their first preference (Kelly et al. 2005; Lewis et al. 2010). Informed individuals are better able to make appropriate decisions regarding treatment options and consider potential impact on lifestyle (Luongo & Kennedy, 2004; Murphy et al. 2008). Research indicates patient and family involvement in decision making regarding CKD treatment options may affect long-term outcome (Lewis et al., 2010). The patient who opts for PD as a first choice will require appropriate self-management skills or have a carer able to manage their treatment. Nurse-assisted PD is currently not an option for our unit. Success depends on physical and mental capacity to adequately manage a daily treatment regimen and requires ongoing support from family and/or friends (Jose et al., 2011; Murphy et al., 2008; Redmond & Doherty, 2005). Additionally, an ability to retain and recall information, availability of psychosocial support and an adequate home environment, including storage area, have been highlighted in the literature as factors which impact ongoing success of PD (Jose et al., 2011).

Following discussion and consideration of current literature, the unit reviewed current CKD and PD referral processes to ensure appropriate provision of information, enabling patients to make an informed decision. This review resulted in a nominated PD nurse regularly liaising with the CKD nurse to provide PD education support, and maintain close review of CKD individuals approaching the need to commence dialysis, specifically individuals who elected PD as a first choice. Additionally, when a patient indicates interest in PD as a first choice, a referral is forwarded to the unit for follow-up. Contact is made with the patient to arrange a home visit, enabling the provision of further information and evaluation of the home environment, including storage capacity and suitable areas to perform dialysis. The home visit facilitates assessment of patient capability and potential support mechanisms, and provides a safe forum in which to further discuss the patient’s understanding of PD. Relevant information is relayed back to the CKD nurse and patient’s nephrologist to assist in ongoing patient education and support prior to commencement of dialysis.

**Prophylaxis and timely treatment of infectious complications**

Jose et al. (2011) recommend the establishment of a protocol for PD catheter insertion. The unit currently has a very good protocol regarding PD catheter insertion, which contains the same points as recommended by Jose et al. (2011); therefore, revision was not considered necessary. Exit sites are routinely examined by PD nurses at every nurse–patient interaction.
Patients are taught to observe their exit sites and report immediately any changes. This enables rapid intervention if required, preventing complication. Antimicrobial cream is used at dressing changes as recommended by Jose et al. (2011) and patients are taught to securely anchor their catheters, reducing the risk of trauma.

The most common PD-related infections are: peritonitis, exit-site and tunnel infections. Peritonitis is the second most commonly reported cause of technique failure in Australia and New Zealand. It remains a primary complication of PD, which significantly contributes to hospital admission and mortality. Additionally, peritonitis is associated with: catheter loss, transfer to HD, transient failure of ultrafiltration, permanent membrane damage and, occasionally, death (Brown et al., 2011; Li et al., 2010). ISPD guidelines state peritonitis rates should be no more than one episode in 18 patient months (Li et al., 2010). Prevention is vital for reducing the incidence of technique failure and improving long-term outcome (Jose et al., 2011). Rapid reduction in inflammation and preservation of peritoneal membrane function with appropriate antibiotic administration is essential in suspected and confirmed cases of peritonitis (Li et al., 2010).

Following attendance at a national nephrology conference, the author became acutely aware of differing practices regarding peritonitis management throughout Australia. This prompted a review of the unit’s peritonitis protocol, comparing it with current ISPD guidelines (Li et al., 2010). Interestingly, Jose et al. (2011) noted a high proportion of antibiotics prescribed for peritonitis is inconsistent with current ISPD recommendations, resulting in inadequate treatment. The protocol review included extensive discussions with nephrologists, pharmacists and PD nurses to guarantee patients with suspected peritonitis receive appropriate treatment promptly, thereby reducing the incidence of peritonitis-related complications. A peritonitis management chart was developed primarily for department of emergency (DEM) medical officers to increase efficiency and facilitate appropriate timely management. It includes drop-down menus with embedded decision support, and reflects current ISPD guidelines for peritonitis or suspected peritonitis management, including antibiotic prescription. Anecdotal evidence has revealed improved peritonitis management with earlier administration of appropriate intraperitoneal antibiotics, resulting in reduced admissions and improved outcome post-peritonitis. The protocol and management chart ensures initiation of intraperitoneal on presentation if peritonitis is a possibility, thereby reducing infection severity and complications. Initiation of empiric antibiotic therapy covering both gram-positive and gram-negative organisms, as soon as possible reduces incidence of serious peritonitis-related complications (Li et al., 2010).

Specific antimicrobial management of peritonitis requires appropriate identification of causative organism (Leehey et al., 2007). Culture-negative peritonitis, defined by the ISPD as: The presence of cloudy dialysate and/or abdominal pain associated with >100 leukocytes (at least 50% of which are polymorphonuclear leukocytes) per microLitre of PD effluent and no microbiological growth after 72 hours of incubation, should not be greater than 20% of all episodes (Jose et al., 2011; Li et al., 2010). Suboptimal specimen collection or inadequate culture methods may contribute to poor peritonitis cure rates (Jose et al., 2011). The unit’s rate (50%) of culture-negative peritonitis during 2009 and 2010 exceeded these recommendations, prompting a review of effluent sampling and culture technique. Extensive discussions with microbiologists and nephrologists resulted in the development of a different procedure to collect dialysate samples, the aim being to reduce incidence of culture-negative results. Education was provided following implementation to ensure understanding. Ongoing education regarding collection technique will encourage continuity with PD nurses, DEM and ward staff should a patient present with peritonitis.

The initial peritonitis protocol review prompted evaluation of the complete PD protocol to ensure accuracy, ease of understanding and adherence to current ISPD guidelines. The protocol includes: method and rationale for catheter insertion, pre-, post- and intraoperative care, exit site management, initiation of dialysis, continuous ambulatory peritoneal dialysis (CAPD) and automated dialysis (APD) methods, and the management of mechanical and infectious complications. Changes were made to reflect current practice and establish continuity in practice. Flow charts with decision prompts were developed and incorporated facilitating ease of understanding for all health care personnel, including DEM staff and ward nurses in additional to renal clinicians. To complement the review process and encourage adherence, area-focused education sessions were separately implemented with theatre, DEM and ward staff. Sessions included medical officers, nurses, students and interested individuals. Regular, ongoing education sessions will encourage adherence and promote understanding, with reduced incidence of error.

Investigation of social causes of technique failure

Technique failure due to social reasons was the most commonly reported reason for permanent transfer to HD in Australia and New Zealand during 2009. “Patient preference” attributed to the majority of these transfers followed by “patients unable to manage self-care” (Brown et al., 2011). PD requires patients to effectively self-manage their treatment on a daily basis. Decisions must be made in regard to dialysate strength in relationship to fluid status, in addition to monitoring a chronic condition and prevention or minimisation of complications. Self-management incorporates the psychological, social and behavioural management of living with a chronic illness; therefore, patients require significant support and education to prevent burnout and reduce uncertainty (Madar & Bar–Tal, 2009; Su et al., 2009).

Adherence to prescribed treatment and self-care regimens are vital to maintain technique viability. A supportive environment and effective communication is central to protect patients and their families from the potentially negative impact of living with ESKD and the demands of self-managing a daily treatment
Patient education and continuous support

Regular communication between patients, care-givers, the PD nurse and nephrologist is fundamental in developing trust and confidence. Patients and their care givers must feel able to openly and honestly discuss experiences, symptoms, problems and concerns with the health care team and, in return, receive support and guidance (Curtin et al., 2005). The challenge for the PD nurse is to effectively explore patients’ concerns, including health, coping mechanisms, mental health, financial burden, physical and cognitive ability, and provide appropriate support.

Regular phone calls and home visits are a vital component of the unit’s practice. Phone calls offer support in managing minor concerns and provide ongoing encouragement and reassurance. Patients feel valued, less vulnerable and more able to effectively manage PD knowing verbal assistance may only be a phone call away. Chow and Wong (2010) state if patients and their families have adequate support from the health care team, they are likely to experience improvement in their emotional wellbeing, resulting in an increased perceived health status.

Home visits, conducted bimonthly as a minimum, enable assessment of the patient's exit site, dialysis environment and storage areas. They provide insight into coping ability and potential concerns, which may not otherwise be evident. Continued and focused training, based on individual needs may also be attended to more effectively in the home environment where implementation of education occurs. Patients and their family members are more comfortable and relaxed, enabling open discussion and greater insight into potential concerns and problems. Home visits present an accurate picture of what is occurring and how patients are coping and may identify concerns which are not apparent during routine clinic appointments (Farina, 2001).

Research indicates peer social support provides opportunity for patients to share and discuss experiences and concerns, reducing uncertainty and enabling individuals to realise they are not alone in their experiences. Peer support assists patients to clarify their experiences and provides context, resulting in an improved ability to self-manage, reduced stress or burnout and superior outcome (Hughes et al., 2009; Madar & Bar-Tal, 2009). The unit’s PD nurses recognised a need for positive interaction between patients to reduce feelings of isolation; therefore, they introduced quarterly PD support sessions. These sessions provide a forum for social networking and information sharing. They are open to all PD patients, relatives and care givers, in addition to individuals who are considering PD. PD nurses attend to facilitate discussion and provide ongoing support.

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Patient education and continuous support

Research indicates that due to the nature of ESKD, dialysis patients have a tendency to either forget or modify basic information they receive at the beginning of treatment (Ozturk et al., 2009). Therefore, effective, ongoing patient education and support are vital to achieve good self-management, enabling the patient to experience quality of life, maintain good health and prevent complications (Bordin et al., 2007; Jose et al., 2011). Poor education results in loss of confidence and confusion, increasing risk of complication and technique failure (Bernardini et al., 2006). Ideally, patient education should commence from the time of modality choice until the patient is safely dialysing (Jose et al., 2011). The unit’s pre-dialysis nurse commences patient education from point of referral from the nephrologist. This education includes maintaining good health, diet, fluid control and all treatment modalities including conservative care.

Training of the unit’s PD patients occurs from insertion of the Tenckhoff catheter, with information provision and support commencing when the patient indicates a preference for PD, as recommended by Jose et al. (2011) and Ozturk et al. (2009). The unit is staffed by part-time PD nurses, which may pose challenges in patient training due to differing techniques. The development of specific training guidelines based on adult learning principles and a spreadsheet identifying key learning concepts enables continuity in training and reduces risk of omission. Additionally, the unit is a parent unit to a satellite PD unit, from which patients requiring hospitalisation are sent. It is imperative to maintain continuity in training and nursing practice. To facilitate this, regular meetings have been implemented, which have proven to be invaluable. They provide a forum in which to discuss patient care, clinical situations, challenging issues and education methods. PD nurses from both units benefited. Similar education practices have been adopted and the same protocols are utilised. Review of these protocols as previously discussed included input from all PD nurses across both units. Regular discussion, sharing and reflection has enabled formation of an informal support network, in which all PD nurses feel able to phone each other to discuss a complex situation or to seek the opinion of another. Shared experiences have enhanced interprofessional relationships and improved clinical competence, which will result in improved patient outcome.

ISPD guidelines recommend retraining following every episode of peritonitis, catheter infection, hospitalisation or interruption in PD (Bernardini et al., 2006). Jose et al. (2011) advocate home-based re–education which includes: connection procedures, infection control, contamination risk, and medication compliance. Regular home visits as discussed previously enables ongoing, home-based individual and focused re–education. Prior to discharge from hospital, the unit’s PD nurses assess patients and retrain them if necessary, ensuring safety and competence before returning home.

Successful PD programmes provide patients with the ability to contact an experienced PD nurse at any time of day, seven days a week (Jose et al., 2011). The unit is part of a small renal unit with a 24-hour nurse on–call service. The on–call nurse covers both HD and PD patients. Therefore, it is not uncommon for an experienced HD nurse, with limited PD...
practice to be on-call. This poses challenges for both nurses and patients. PD nurses, who know the patients well, often carry information in their head, and may not always consider this inside knowledge necessary to pass on. Obviously the on-call nurse does not need, or want to know, all the details of each patient, only what may be pertinent while on-call. To facilitate improved communication between the PD unit and on-call staff, a PD handover document was developed. This sheet provides on-call nurses with up-to-date information regarding each patient, including: PD regime, adequacy, residual renal function, membrane type, transplant status and any current concerns. On-call nurses have expressed greater confidence in receiving PD calls as they now have relevant information at their fingertips and possess a greater understanding of each patient’s current health status and potential concerns. This has resulted in improved patient outcome following after-hours calls, and a reduced need for PD nurse follow-up.

To further facilitate improved understanding, ongoing individualised education is offered to on-call staff, and several flow charts detailing the process required following common after-hours incidents were developed. These included potential contamination, exit-site trauma or infection and blood in PD effluent. The flow charts have been incorporated into the revised protocols and have been utilised by less experienced PD nurses. The result again is improved patient care and better outcomes.

Clinical governance and professional standards

Throughout this review the unit did not consider all areas stated in Jose et al.’s (2011) paper. The unit is small with limited PD staff who work closely together and with the nephrologists. On-call staff are regularly educated on changes to PD patient management and are provided with the opportunity to update skills and undertake competencies.

ISPD guidelines recommend all PD programmes regularly monitor PD-based infection rates, including exit-site infections and peritonitis. Monitoring should include the root cause of infection and cultured organisms, thereby providing a base for intervention if warranted, or re-education if the infection is likely to have been caused by poor technique (Li et al., 2010). Accurate tracking of infection rates facilitates improved outcomes and reduction repeat infections.

Continuous quality improvement programs must be established with regular and transparent reporting of outcomes (Jose et al., 2011).

The unit reassessed data collection methods. Monthly reports on total patient numbers, number of patients with a catheter who have not yet started, and CKD patients interested in PD as first choice are now compiled. The number of patients who do not meet current ISPD adequacy guidelines, incidence of exit-site infection and peritonitis rates are detailed and analysed. Analysis and review identifies possible gaps in patient education and provides information regarding trends and infection rates, thereby enabling timely implementation of interventions and further education as required.

Conclusion

It is well recognised within the renal community that home-based renal replacement therapies result in superior patient outcome and greater quality of life. There is a need for improved research and data collection to support this. Patients electing a home-based therapy require appropriate education and ongoing support to ensure they are able to succeed.

Suitable patient selection ensuring appropriate self-management skills, physical and mental capacity, with adequate support from family and the renal team reduces risk of technique failure. Infection has been cited as a major cause of technique failure, so the unit reviewed protocols relating to prophylaxis and management of infectious complications, resulting in clearer, more user-friendly protocols aligned with the ISPD guidelines.

Social reasons are commonly listed in the ANZDATA as reason for PD technique failure. Ongoing education and support for the patient and carers is vital to reduce burnout and ensure ongoing success. The unit developed a community-based support network with involvement from health professionals as required in an effort to ease carer burden and support individuals undertaking PD. In addition, regular home visits and frequent phone calls help patients to feel supported and less isolated, resulting in reduced stress. Ongoing education for both carers and patients ensures good management and promotes health with reduced risk of complication. Continued discussion with nephrologists and clinicians involved in the care of renal patients, together with ongoing evaluation of strategies discussed enhances patient care. Proactive management and ongoing individualised education as described will result in improved patient outcomes, greater compliance and reduced incidence of technique failure.

References


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