

Improving outcomes in peritoneal dialysis exit site care

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Abstract

Background: Benchmarking infection rates for peritoneal dialysis (PD) catheter-related infections is mandatory for good patient care. There is no current established benchmark for PD exit site infections (ESIs). The Royal Hobart Hospital (RHH) PD unit established our own benchmark at 1/25 patient-months and in 2009 the PD ESIs reached 1/21 patient-months, which prompted investigation into our current exit site (ES) care routine.

Method: A quality improvement process was used to implement a more structured approach to the existing ES care plan. Particular changes included pre-Tenckhoff catheter insertion nasal swabs for the patient and primary carer, treatment for *Staphylococcus aureus* incidence using mupirocin, emphasis and education on hand hygiene, and a change to chlorhexidine body wash around the ES during showering, with medihoney applied around the ES, and regular review of our infection rates with the consultant infectious diseases and consultant nephrologist.

Results: ESI rates improved from 1/20.8 patient-months to currently 1/203 patient-months in March 2014. Development of a protocol on care of the adult with a Tenckhoff catheter was the culmination of this quality improvement activity.

Conclusion: A structured, quality improvement approach was beneficial to the success of this project. Continuous monitoring of outcomes to patient care against a benchmark is essential to any unit's quality improvement programme.

Keywords

Exit site care, infection, peritoneal dialysis guidelines, Tenckhoff catheter.

Introduction

The International Society for Peritoneal Dialysis (ISPD) position statement on reducing the risk of peritoneal dialysis (PD) catheter-related infection states:

For a peritoneal dialysis (PD) program to be successful, close attention must be paid to preventing PD-related infections (defined as exit-site infections, tunnel infections and peritonitis) (Piraino et al., 2011, p. 614).

The ISPD defines exit site infection (ESI) as:

“The presence of purulent drainage, with or without erythema of the skin at the catheter epidermal interface. Pericatheter erythema without purulent drainage is sometimes an early indication of infection but can also be a simple skin reaction, particularly in a recently placed catheter or after trauma to the catheter” (2005 update p. 111).

Therefore, it is best practice within PD units to monitor catheter-related infections, exit site (ES), tunnel infection and peritonitis. There is a well-established benchmark for peritonitis rates by ISPD (2010) and Caring for Australasians with Renal Impairment (CARI) Guidelines (Walker 2014), which is 1/18

per patient-month (ppm), but none exists for ESI rates. Our unit established our own benchmark for ESIs at 1/25 ppm.

The problem

In 2009 regular review of our catheter-related infections showed a doubling in ESIs (19 infections) from 2008, which related to 1/20.8 ppm. This provided the impetus for us to look at the method by which we were caring for the ES of our patients.

Established practice and outcomes — pre-2010

There was no input from microbiology or infection control on catheter-related infections and, importantly, there was no formal policy of care of the Tenckhoff catheter (Jose et al., 2010).

The pre-PD pathway included an initial home visit, which was carried out to assess the home environment for storage, place of dialysis, and hand hygiene facilities. Nasal screening for *Staphylococcus aureus* was not routinely performed prior to insertion of the Tenckhoff catheter. One dedicated surgeon was used for catheter insertion, whereby the catheter exit tunnel site was placed downward-facing, immobilised and an intraoperative antibiotic was given.

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We had already established a care routine for the first two weeks postoperatively, where the patients are visited prior to hospital discharge by an expert PD nurse and written instructions are given and explained to the patient. The ES, catheter and suture line are monitored, but undisturbed if no abnormality is detected and the patients are advised not to shower, and to avoid wetting the dressing when bathing. "Calculation of peritonitis rates should be standardised and should be clearly defined in any publication on peritonitis. Most observers would start to calculate the time at risk for peritonitis as the first day of training; some might consider the date of catheter insertion to be the starting point. The former is probably preferable, because the latter might lead to falsely low rates, especially in centres that place the catheter many weeks or even months before the start of training." (Piraino *et al.*, 2011, p. 616). Therefore, data collection for catheter-related infections at the Royal Hobart Hospital (RHH) commences at two weeks postoperatively, when education for catheter care is complete and the patient is independent in the care of their catheter.

All education and training for PD was undertaken within the home environment, allowing risk assessment for structural and environmental hazards. Thus risks could be identified quickly, and constructively resolved with the cooperation of the patient. Verbal instructions and practical demonstrations were given for ES care where the patient followed a routine using chlorhexidine 1% hand cleaning solution to clean ES during showering and after used Medihoney® (Derma Sciences) at the ES with a Cutiplast™ (Smith & Nephew) dressing to cover. Our use of Medihoney® originally started in 2007.

Regular three-monthly visits occurred to meet each patient and their partner in their home to check on various areas of therapy management including hand hygiene, ES examination, and record keeping (blood pressure, weight, bowel care, ultrafiltration and dialysis prescription), discussing trends and blood results.

Verbal instructions were given on signs and symptoms of peritonitis and ESI, and what to do if they were suspicious one had occurred. The ES examinations are undertaken as part of our proactive management, allowing base line establishment and regular monitoring.

Review period — early 2010

To commence this quality improvement initiative, staff met in 2010 to review the existing care plan. Firstly and most importantly we recognised that we did not have a formal policy for care of the adult with a Tenckhoff catheter. To formulate a robust policy, we undertook a search for published evidence or guidelines. Part of our analysis revealed that the predominant causative organism for ESIs in our unit in the preceding years was *S. aureus*; therefore it was recognised input from other relevant departments within the hospital was imperative.

Meetings were instigated with the microbiology, infection prevention and control units for drafting advice for the new policy. Some points of reference from these units that were supported by evidence from the literature (Mehta *et al.*, 2013) were an appropriate plan for nasal swabbing and subsequent treatment and further swabbing for *S. aureus*-positive results, including ongoing, long-term ES and nasal swabbing. Regular six-monthly meetings commenced with infection prevention and control unit to monitor catheter-related infections and review guidelines such as our peritonitis guideline.

Change implementation phase — late 2010 Eradication of *S. Aureus*

The home therapies staff commenced pre-catheter insertion nasal swabbing for patient and carer. Any incidence of *S. aureus*-positive cultures were treated with the use of chlorhexidine body wash daily and nasal mupirocin three times a day for one week and re-swabbing a week later (Mehta *et al.*, 2013). If that swab was positive for *S. aureus*, another week of nasal mupirocin was commenced and further re-swabbed. We now have a formal algorithm directing the management of nasal and ES swabs, (Figures 1 and 2).

Involvement in national trials

The RHH renal unit enrolled in the Honey-pot trial in 2010, which was a randomised, controlled trial of ES application of Medihoney™ Antibacterial Wound Gel for the prevention of catheter-associated infections in PD patients (Johnson *et al.*, 2013). The unit continued the use of Medihoney™ on the ES for those patients who were not enrolled with the Honey-pot trial. The trial group concluded that they could not recommend a practice change to Medihoney in non-diabetic patients (Johnson *et al.*, 2013). We have maintained our standard practice with continuation of Medihoney for ES management as our results to date have not indicated a need to improve or adjust our management protocol.

Change in hand hygiene regime

During the year, a hand hygiene policy was introduced at the RHH, which followed the World Health Organization (WHO) recommendations (WHO, 2009). We adopted this policy for our patients, which involved further education, including supplying each patient with copies of the WHO guidelines, (Figure 3). This time was felt to be very beneficial to reinforce hand hygiene with each patient and the importance of carrying out the hygiene properly.

In November 2010, our unit applied to be involved in the Kidney Health Australia (KHA) — CARI Guideline Antibiotic Implementation Project, called, "Improving Prophylactic Antibiotic Use to Prevent Infections in New Peritoneal Dialysis (PD) Patients in Australasia". The study purpose is to identify the barriers to adhering to the CARI guidelines relevant to prophylactic antibiotic use in new PD patients in Australia

Figure 1

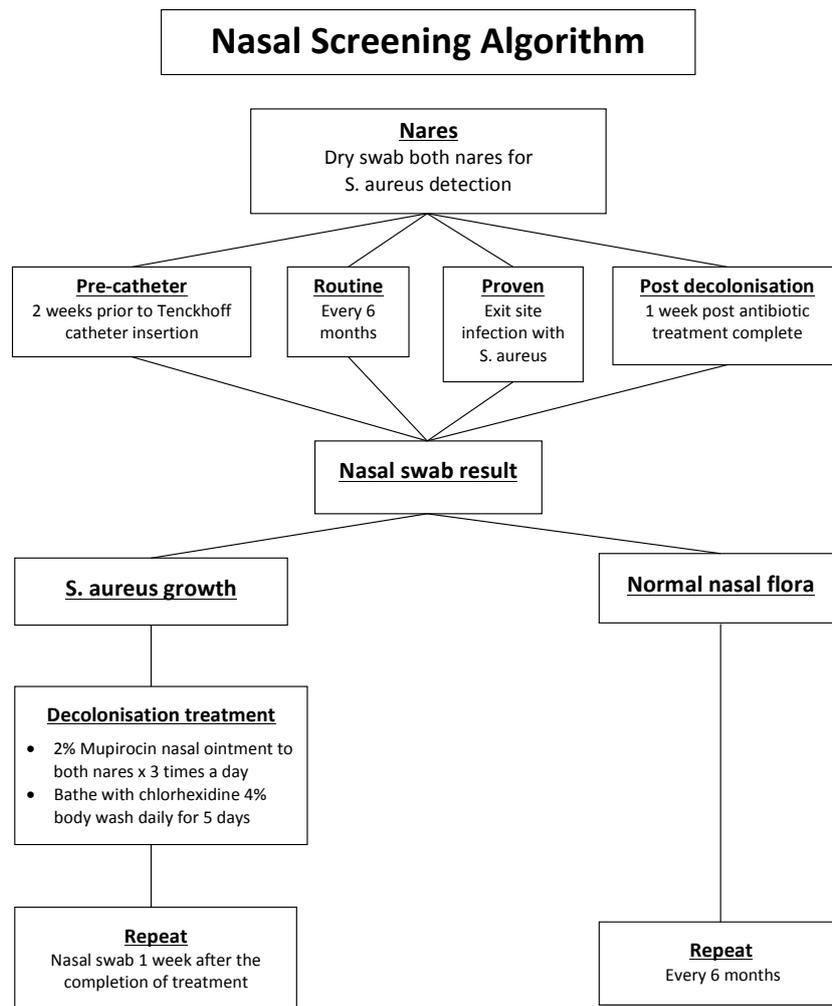


Figure 2

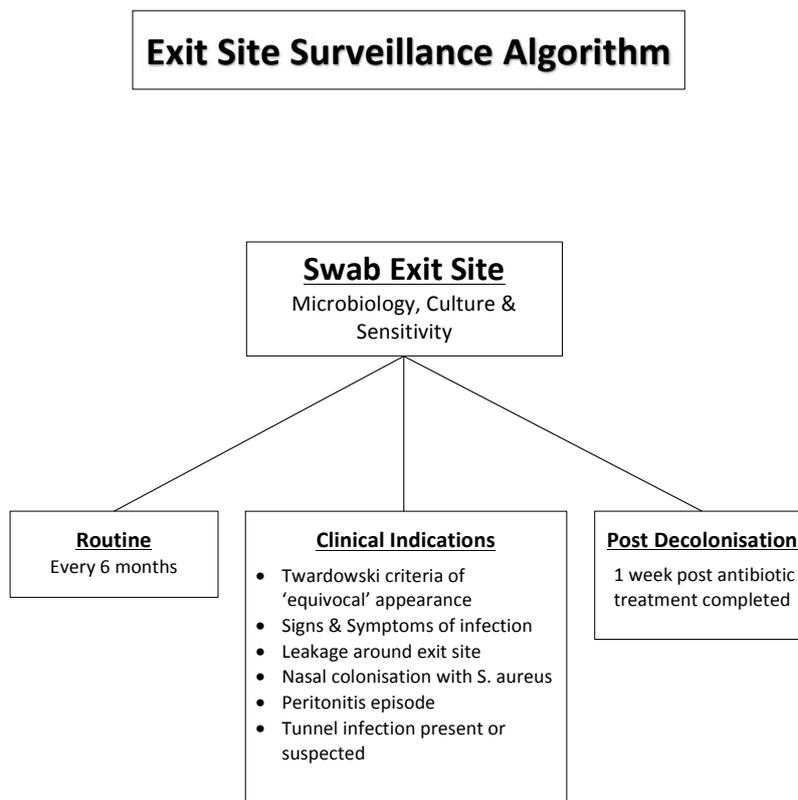


Figure 3



Table 1

- Ongoing exit site care
- Shower with exit site dressing on, washing all of your body.
- Take off dressing and allow water to run over exit site.
- Using gauze soaked with Microshield 2[®] body wash, wash gently around exit site and allow water to run over exit site.
- Observe exit site for redness or signs of infection.
- Step out of shower attending your exit site first.
- Dry exit site with another piece of gauze before drying the rest of your body.
- Apply medihoney and cutiplast[®] dressing.
- Anchor catheter with tape where catheter falls naturally.
- Dry the rest of your body.

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and New Zealand and to develop and implement strategies to increase the use of appropriate antibiotics in new PD patients. This involves regular communication and several face-to-face meetings of all eight participating centres.

In 2011 we were successful in our application to be involved in the KHA — CARI Guideline Antibiotic Implementation Project. Participating in both this project and the HoneyPot trial benefited our unit because of the increased networking opportunities with interstate and international PD units, generating ideas between units to focus on our practice.

Attending the meetings also highlighted the issue that although each unit was striving for best practice and good outcomes for their patients, each unit's method of care was different and that there is a lack of evidence-based, definitive guidelines for the care of the Tenckhoff catheter, although recommendations are available from the ISPD.

Patient education

As the policy for care of the Tenckhoff catheter evolved, changes were initiated as the review team identified new information. Apart from previously mentioned changes, we supplemented verbal and practical demonstration for education of ES care with written instructions about how to care for the ES during showering (Table 1, unit-generated).

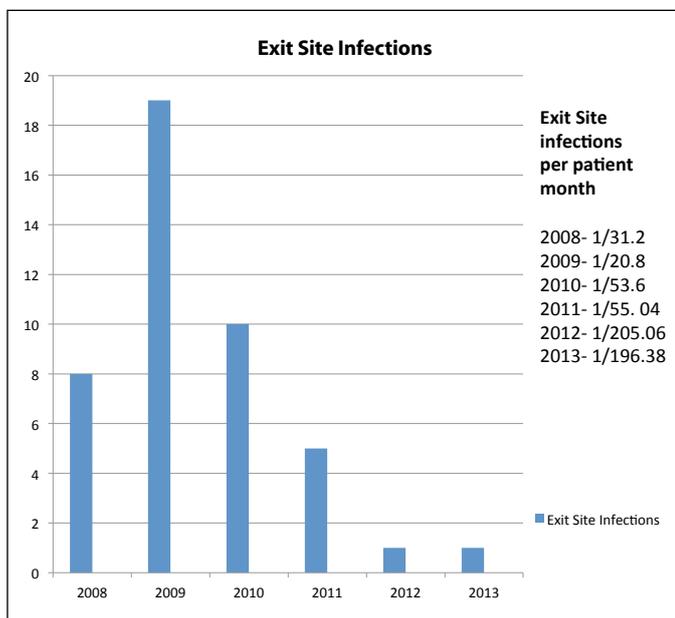
At the end of 2010, after we had instigated the above changes, we had halved the incidence of ESIs from 19 to 10, which collated to 1/53.6 ppm.

Consolidation time — 2011

Increasing support and Information

During 2011 we introduced personal information folders for each patient. This suite of education materials has been

Figure 4



designed to facilitate prompt detection and early management of complications by our patients. The suite includes troubleshooting guideline algorithms for ES leaks and suspected ESIs (Figure 6 and 7, unit-generated). Also included are quick guides to APD and CAPD procedures (unit-generated), ES care (Table 1, unit-generated), Bristol stool chart (Lewis & Heaton, 1992), back care (2010, unit-generated), WHO hand hygiene charts (WHO 2009) and “Staying well on Peritoneal Dialysis” (unit-generated) with contact information.

Change in skin cleanser

Further practice changes occurring during 2012 were that our PD and haemodialysis units changed the cleaning solution to Chlorhexidine 2™ skin cleanser in line with the International Centre for Disease Control (CDC) guidelines for prevention of intravascular catheter-related infections (O’Grady *et al.*, 2011). The chlorhexidine is used for hand washing and to clean the ES with gauze while showering, without harming the integrity of the catheter (Covidien, n.d.; Johnson and Johnson, 2011).

Re-enforcing education

Education and support were targeted when we commenced PD master classes for our patients that involved inviting patients and partners to come to our Karingal home renal therapies unit once a year, where we conducted refresher education sessions and scenarios in a fun, non-threatening environment. These sessions provided reinforcement of infection prevention strategies related to PD and also psychosocial support for the patient and carer.

Results

In 2012 and 2013 our unit had one incidence each year of ESI collating to 1/202 ppm and 1/196 ppm respectively (Figure 4). To date (April 2014), our ESI rates are running at 1/203 ppm. Also, during this time, we have experienced a corresponding drop in peritonitis rates over this same period, from 1/15 ppm in 2009 to 1/81 ppm in 2013 (Figure 5).

Figure 5

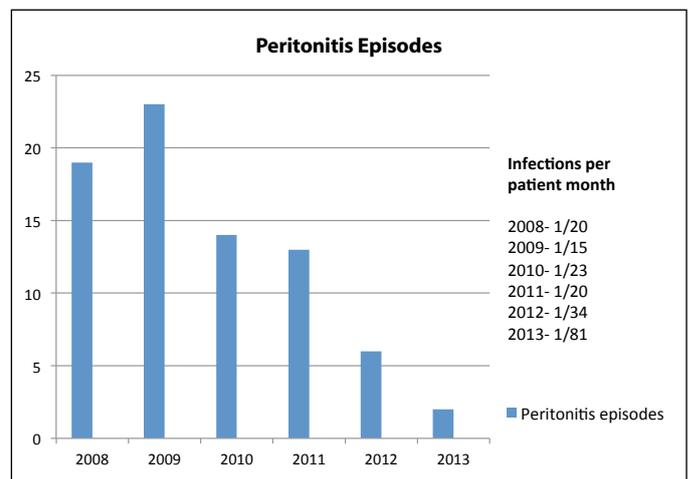
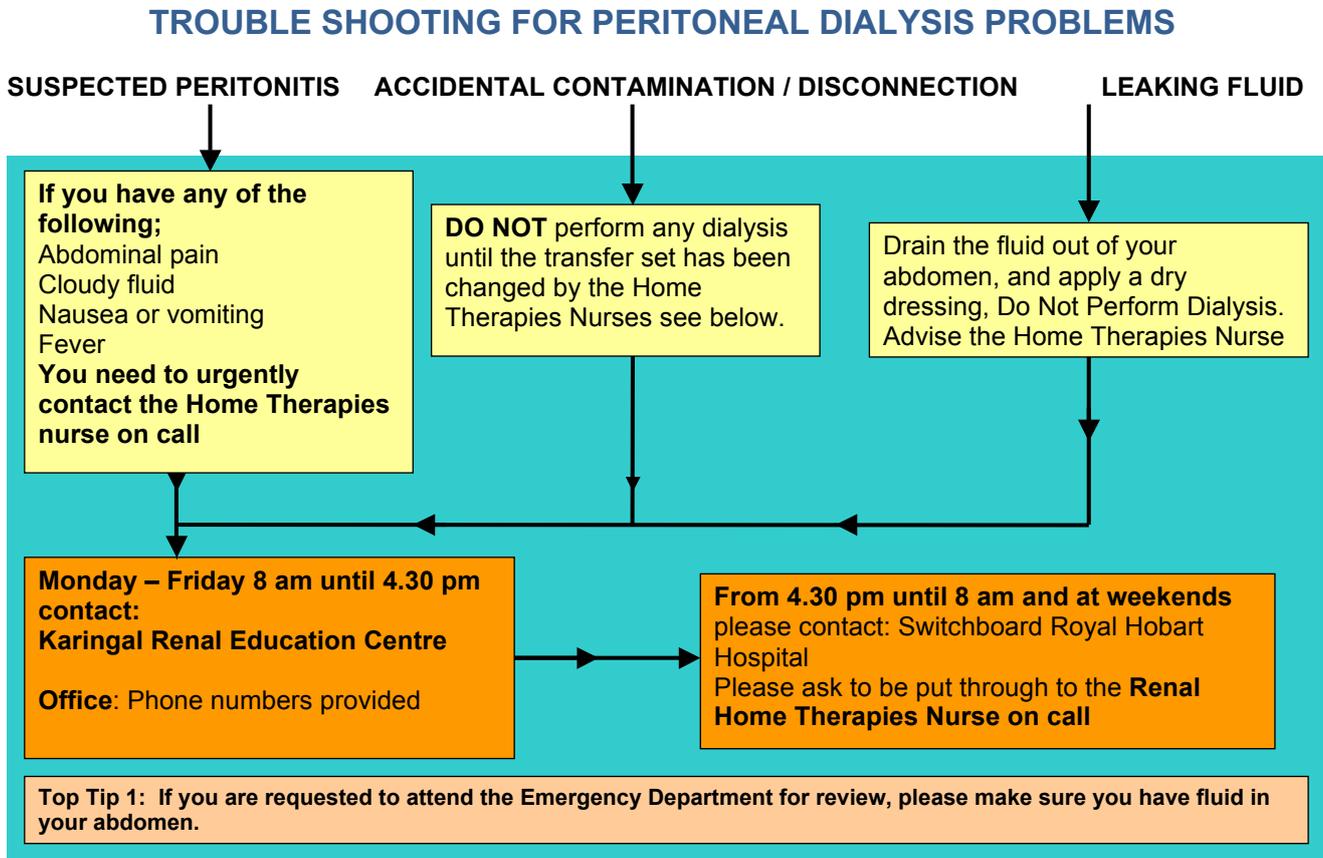


Figure 6



Discussion

This was a quality improvement initiative over three years during which we have implemented several changes to show such an improvement in our incidence of ESIs and peritonitis rates. The main areas of practice change were concentrating on hand hygiene, a more rigorous ES/nasal swab reporting and treatment routine to reduce the incidence of *S. aureus* and also changing the solution used to wash the ES. The master classes have consolidated the education and enhanced psychological support for patients and carers and are now a fixture in our work calendar. At a management level, the involvement of the microbiology and infection prevention and control units has increased the robust nature of our review process in reporting catheter-related infections.

Assessment of the patient’s home pre-catheter insertion and training in the home environment remain within the programme because we feel that there are very positive outcomes from this practice. The predominant reasons are the environmental risk assessment and environmental familiarity for the patient during education. The *S. aureus* ESIs have been decreased to zero, possibly due to the nasal/ES screening programme we have implemented. Though it is not an

obvious outcome, the master class days have been shown to be beneficial, with our patients feeling that they are supported in their endeavours at dialysis. The culmination of these activities in 2013 was the implementation at the RHH of the Clinical Guideline for the Care of the Adult with a Tenckhoff Catheter.

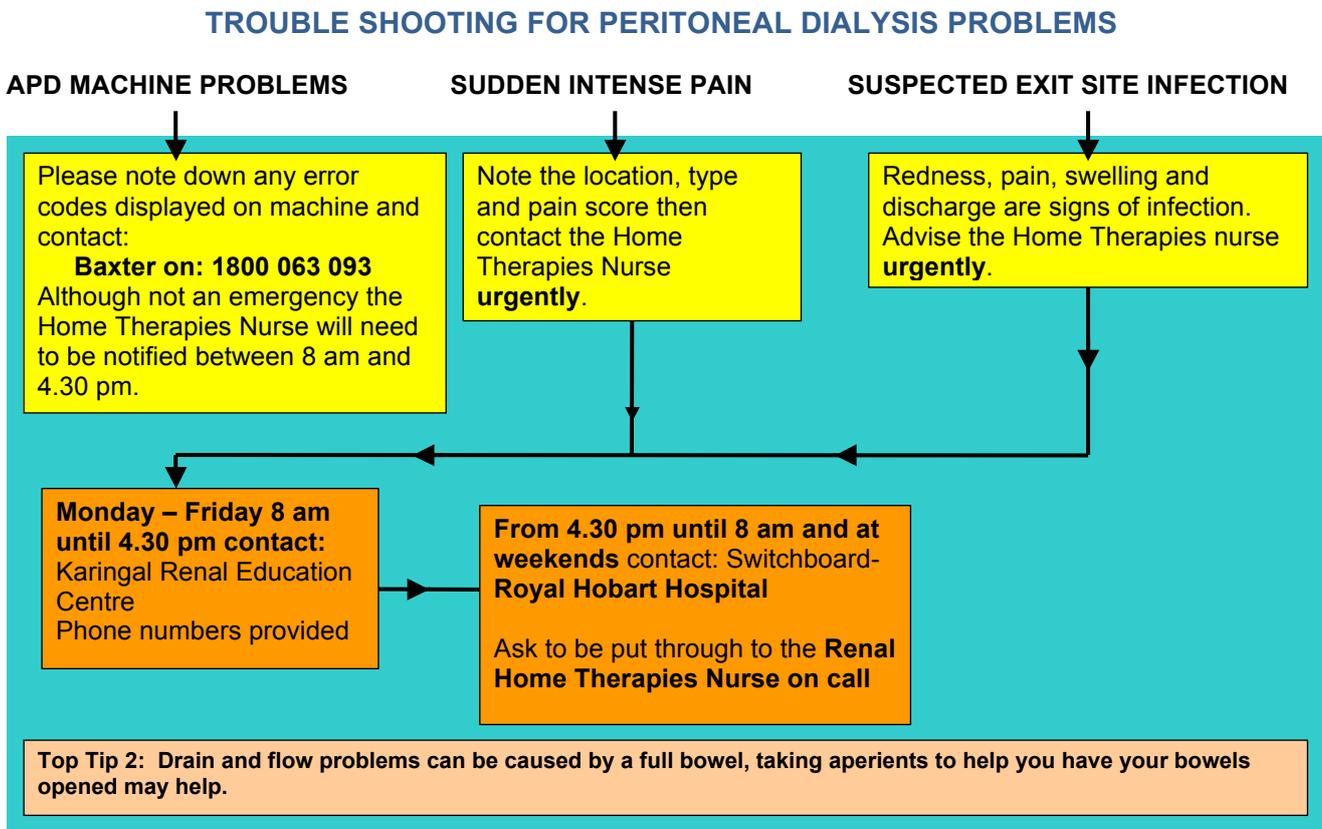
Conclusion

The quality improvement process was extremely beneficial in identifying areas that required change and providing a plan to follow.

A limitation to the quality improvement process was that we were unable to specify one specific change which improved our ESI rates as possibly all the changes together resulted in the improvement. Or, conversely, choosing to concentrate in this specific area of care improved the rate of incidence.

Looking forward, we aim to remain vigilant in monitoring catheter-related infections through the quality improvement process, as close scrutiny of each incidence improves outcomes for the present time and changes future practice. Also, as we are involved in the KHA-CARI Antibiotic project we are awaiting the outcome of the new guidelines/recommendations that will be implemented following the results of the project.

Figure 7



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