Constipation in patients on peritoneal dialysis: a literature review
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Abstract
Aim Constipation is a common medical condition that can lead to a loss of quality of life and increase health care costs. The incidence of constipation rises with increasing age in both sexes. In patients with chronic kidney disease (CKD) on peritoneal dialysis (PD), constipation is associated with peritoneal catheter malfunction and peritonitis, which can result in dialysis modality failure. For patients on PD, constipation needs to be dealt with in a proactive, preventative manner rather than when it becomes a problem.

Method A search of electronic nursing, medical and allied health databases including Medline, Ovid, CINAHL, PubMed, Proquest, Wiley, Scopus, Cochrane Library and Evidence-Based Resources (Joanna Briggs Institute) was performed. Keywords used were constipation, peritoneal dialysis, dialysis, chronic kidney disease.

Results Five research articles were found that were specific to patients on PD. A meta-analysis is included on the use of laxatives for chronic constipation as laxatives are widely used in PD patients. From the literature it is evident that constipation is a subjective term and, while laxative use is common, it is used as perceived by the patient and their requirements. There are compounding factors that contribute to constipation in the dialysis population such as diet and fluid restriction, use of medications such as phosphate binders and resins for controlling hyperkalaemia.

Conclusion Although constipation can have serious consequences for PD patients, there has been little research on best management. Information on chronic constipation management in the general population is helpful, but more research is required, particularly in the PD patient group.

Keywords
Constipation, peritoneal dialysis, dialysis, chronic kidney disease.

Introduction
Peritoneal dialysis (PD) is an accepted treatment modality for patients with chronic kidney disease (CKD), offering patients an effective treatment that can be carried out at home. In Australia there are over 2,200 patients on PD, which makes up 21% of the total dialysis population (McDonald et al., 2009). The prevalence of PD as a treatment modality differs substantially worldwide. According to the Australian and New Zealand Dialysis and Transplant Registry 2010 (ANZDATA) report, the proportion of patients receiving PD has decreased in both Australia and New Zealand. This is in line with other developed countries such as the US, Canada and some European countries, where the use of PD has actually declined in the past 10 years. Interestingly over 65% of patients receiving PD live in developing countries (Lameire & Van Biesen 2010).

Constipation is a general symptom that can have both functional and organic causes and can occur in chronic illnesses such as depression and diabetes (McCallum et al., 2009). Constipation is described as difficult or infrequent bowel movements, straining during defecation, passing hard stools and difficult stool evacuation (Huether, 2006; Saad et al., 2010). The term constipation is difficult to define because it is a subjective experience and can have different meaning among individuals (Longstreth et al., 2006). There is great variability in studies on the prevalence of constipation, primarily due to the differing criteria used to define constipation and that most studies rely on self-reporting of constipation by patients (Garrigues et al., 2004; McCallum et al., 2009). In the general population constipation is a common medical condition that can lead to a loss of quality of life and increase health care costs (Selby & Corte, 2010). There are various factors that contribute to constipation including a low-fibre diet.
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diet, poor fluid intake, sedentary lifestyle, lack of exercise and various medications especially calcium and iron supplements (Digestive Health Foundation, 2007; Huether, 2006). The incidence of constipation rises with increasing age in both males and females (Digestive Health Foundation, 2007; Selby & Corte, 2010).

Early reports have referred to constipation as a major problem for patients with CKD both on PD and haemodialysis (HD) due to diet and fluid restrictions and the need for certain medications, in particular, phosphate binders (Adams, 1982; Chambers, 1983; Stone, 1977; Yasuda et al., 1995). Constipation in itself is not a life-threatening condition; however, besides being uncomfortable for the patient, it can have devastating effects for some people on PD (Yasuda et al., 1995). Constipation is associated with peritoneal catheter malfunction or catheter migration, usually characterised by poor dialysate outflow or failure to drain the peritoneal cavity (Gokal et al., 1998). Peritonitis may also be related to constipation, which may lead to dialysis modality failure (Gokal et al., 1998; Li et al., 2010; Singharetsum & Holley, 1996). Colon perforation, a rare complication, has been reported as a result of chronic constipation in continuous ambulatory peritoneal dialysis (CAPD) (Tzanetou et al., 2004).

In Australia, patients on PD tend to be in the older age group as shown by the ANZDATA registry, where 46% of patients on PD are in the over 65 years age group and 41% of new PD patients are over 65 years. This is compounded by the fact that 45% of new PD patient have diabetic nephropathy as their primary renal disease (McDonald et al., 2009); therefore making these patients already at increased risk of constipation.

Management of constipation in adults in the general population usually involves increasing dietary fibre and fluid intake, avoiding use of constipating medications and increasing physical activity (Digestive Health Foundation, 2007). However, for PD patients, constipation management options are usually restricted in some form, because of diet and fluid restrictions and the use of certain medications such as phosphate binders, which cannot be avoided.

Constipation in patients receiving PD, despite the potentially serious consequences, is poorly reported and tends to get overlooked in both national and international best practice guidelines (Caring for Australians with Renal Impairment [CARI] 2004; Piraino et al., 2005). Currently there are no clear guidelines on the prevention and treatment of constipation in this group. Constipation in PD patients needs to be dealt with in a proactive, preventative manner rather than when it becomes a problem. The purpose of this paper is to review current research literature concerning constipation in patients receiving PD as a basis for management recommendations.

Search strategies

A comprehensive search of electronic nursing, medical and allied health databases including Medline, Ovid, CINAHL, PubMed, Proquest, Wiley, Scopus, Cochrane Library and Evidence-Based Resources (Joanna Briggs Institute) was performed. Keywords used were constipation, peritoneal dialysis, dialysis and chronic kidney disease. The search dates were not restricted. The advanced search in PubMed included MeSH of major topic and terms constipation, peritoneal dialysis and chronic kidney disease.

Search results

The main focus for this review was research papers with a specific focus on constipation in PD patients; however, the literature search yielded little information on constipation specifically in this patient group. Five research articles were found from the United Kingdom (UK), Taiwan, Denmark, Greece and Japan on constipation in both PD and HD patients and were included in this review. An Australian meta-analysis on the use of laxatives for chronic constipation was also included as it was felt to be relevant as laxatives are widely used in this group of patients. Table 1 summarises each of the articles. Papers where the focus was not specifically on constipation, such as Strid et al. (2002), who investigated the prevalence of gastrointestinal symptoms in patients with chronic renal failure were not included. The themes throughout the literature were that constipation is a
subjective term and, while laxative use is common, it is used as perceived by the patient and their requirements. There are compounding factors that contribute to constipation in the dialysis population such as diet and fluid restriction, use of medications such as phosphate binders and resins for controlling hyperkalaemia.

Findings
To prevent constipation, a diet which is high in fibre is generally recommended. Fibre stimulates bowel activity, increases stool bulk and decreases intestinal transit time (Sutton et al., 2007; Yasuda et al., 2002). For patients on PD, dietary restrictions, especially high-fibre foods, which are generally high in potassium and phosphate are restricted (Sutton et al., 2007). In a UK study, Sutton et al. (2007) found that increased dietary fibre was as effective as laxatives and was the preferred choice for patients on PD. The authors suggested that patients on PD may not necessarily need greatly restricted fibre diets and this was supported by Yasuda et al. (2002) who found that patients on CAPD ate more potassium-containing foods such as fresh vegetables and foods higher in fibre than patients on HD yet had lower serum potassium levels and reported fewer episodes of constipation. Yasuda et al. (2002) found that increased rate of constipation was aligned with increasing age in CAPD patients (50±13.7 years). The patients in this study are younger compared to the Australian PD group; therefore, it could be hypothesised that constipation in the Australian PD group may be more prevalent due to the increase in the age of patients.

A major disadvantage in research on constipation is that information is based on self-reported bowel frequency through retrospective questionnaires. Wu et al. (2004) objectively investigated constipation by estimating total and segmental colonic transit times in both CAPD (n=63) and HD (n=56) patients and compared to healthy volunteers (n=25). Total and segmental colonic transit time was estimated by abdominal x-ray after ingestion of one gelatin capsule containing radiopaque markers daily for six days. After ingestion, these markers are followed by serial abdominal x-rays where colorectal transit time is estimated. Participants were asked to continue their usual habits, diet and activity. The authors found that, overall, HD patients had significantly longer colonic transit time (p<0.05). Patients on CAPD had longer total colonic transit times than the healthy volunteers; however, the difference was not significant. Furthermore the authors found that in both the healthy volunteers and the dialysis patients there was discrepancy between total colonic transit times and self-reported constipation, highlighting the limitations on self-reported information, as previously discussed. Again in this study PD patients were younger (50.3±11 years) than the Australian population of PD patients, so the findings from Wu et al. may not be generally applicable.

Laxatives are commonly used to treat constipation and there are a myriad of preparations readily available. Jones et al. (2002) conducted a meta-analysis of published studies on the efficacy of laxatives in constipation; however, only 11 studies produced usable data of patients on laxatives and placebo. Unfortunately Jones et al. (2002) did not define constipation and also found insufficient evidence to conclude that laxatives were superior to placebo in chronic constipation. A contributing factor was that patient perceptions of constipation or altered bowel function were not clearly defined. This was identified by the authors to be a possible explanation for the strong placebo effect as patients with less serious constipation included in the trials may have been easier to treat. A further limitation of this study is the lack of available data which reflects the current findings in relation to PD patients.

Laxatives are generally classed as bulking agents, osmotic laxatives, faecal softeners and stimulant laxative. In the Jones et al. (2002) study, the authors were unable to quantitatively assess the tolerability of laxatives; however, side effects such as abdominal distension from bran, bloating, gas production and increased fluid requirements for bulk laxatives, urgency, cramps and flatulence from senna fibre combinations were alleged. The use of laxatives and their effectiveness in PD patients varies according to usage, which is a result of the individuals’
perceived requirements. This perceived requirement and the patient’s perception of constipation can, in itself, result in constipation requiring medical intervention in the form of hospital visits, x-rays or hospital admission (Sutton et al., 2007).

There is a lack of available literature on the use of laxatives in PD patients. In a small study, Mimidis et al. (2005) examined the efficacy of polyethylene glycol (PEG), an osmotic laxative in 24 CAPD patients. All patients had previously tried other products and a high-fibre diet, with only partial response. Clinical efficacy and tolerability were assessed via a patient diary, where stool number and consistency, painful defecation, rectal irritation, flatus and blood in stools were reported. Only 21 patients completed the protocol and all patients reported rapid improvement in bowel habits with PEG. As with previous studies, this study is limited by its small sample size. Patient reporting was by use of a daily diary and patients were asked to rate the number and consistency of stool in a 1–5 scale.

Although over 20 years old, Dessau et al. (1989) conducted a prospective, randomised, crossover trial in Denmark, on the influence of psyllium seed husk on azotaemia, electrolytes and bowel regulation in patients on CAPD. The authors found that psyllium husk could be used as a laxative in some CAPD patients; however, psyllium husk substituted laxatives for only three patients, whilst other patients needed psyllium husk and lower doses of another laxative. This study, as others, is limited by its very small sample size.

**Discussion**

For patients on PD, constipation can have major repercussions by interfering with ongoing dialysis treatment through dialysate flow problems, its relationship to peritonitis and, in rare instances, colon perforation due to chronic constipation (Gokal et al., 1998; Li et al., 2010; Singharetanam & Holley, 1996; Tzanetou et al., 2004). As identified by the literature, one major problem with diagnosing constipation is the reliance on self-reporting. The Rome

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**Figure 1. Bristol Stool Chart.** http://upload.wikimedia.org/wikipedia/commons/b/b4/Bristol_Stool_Chart.png
### Table 1. Constipation in patients on peritoneal dialysis: a literature review

<table>
<thead>
<tr>
<th>Authors</th>
<th>Design</th>
<th>Sample</th>
<th>Summary table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sutton D (2007)</td>
<td>Interventional study</td>
<td>PD for at least 3 months (n=126)</td>
<td>High-fibre supplement gave best result in terms of stool form and side effects such as bloating, flatulence and predictability.</td>
</tr>
<tr>
<td>Mimidis K (2005)</td>
<td>Interventional study</td>
<td>24 out-patients on CAPD pts (n=24)</td>
<td>PEG laxative is effective in increasing bowel frequency and improving stool consistency and efficacy in CAPD patients in the short term.</td>
</tr>
<tr>
<td>Wu M (2004)</td>
<td>Prospective study</td>
<td>Patients selectively randomised based on dialysis modality HD/CAPD/control group</td>
<td>Age correlated to longer colonic transit times.</td>
</tr>
<tr>
<td>Yasuda G (2002)</td>
<td>Multicentre comparative study</td>
<td>CAPD (n=104) male, 76 females; mean age 59.3±12.1 years.</td>
<td>Chronic constipation difficult to define because of subjectivity.</td>
</tr>
<tr>
<td>Dessau R (1989)</td>
<td>Prospective, randomised, crossover study</td>
<td>Patients on CAPD (n=36); median age 54 range 19–74 years.</td>
<td>Psyllium husk can be used as a laxative in some CAPD patients.</td>
</tr>
</tbody>
</table>
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criteria, a useful instrument for defining constipation, has been used as a research and clinical tool and can be useful in defining and identifying constipation (Garrigues et al., 2004; Pappas et al., 2008; Rome Foundation, 2010; Selby & Corte, 2010), yet it was not referred to in the literature concerned with PD patients. More recent literature has identified the discrepancy between self-reported constipation and the actual condition, based on Rome criteria. The findings indicating that the rate of constipation is considerably higher when based on self-reported definitions, probably due to personal perception rather than the actual problem (Garrigues et al., 2004; Pappas et al., 2008). The limitations of self-reporting were identified by Jones et al. (2002) and Wu et al. (2004) in their studies and certainly needs to be taken into consideration in future research.

Another limitation in the current research is the use of questionnaires that depend on the patients’ ability to recall symptoms (Pappas et al., 2008). In the study by Yasuda et al. (2002) a 12-month retrospective questionnaire was administered; however, the reliability of the data is questionable as it relies on the patients’ ability to recollect information on their bowel habit for the previous 12 months.

Sutton et al. (2007) and Mimidis et al. (2005) used prospective studies and administered diaries that patients recorded in daily. This gives more credit to the information as it does not rely on patient recall; however, it does rely on the accurate record-keeping by the patient.

The Bristol Stool Form Scale (BSFS) (Figure 1) is another tool that can assist in the evaluation and diagnosis of constipation. The stool form scale was first reported by Lewis and Heaton (1997) to monitor change in intestinal function. The BSFS enables patients to identify their stool form by using seven categories to classify stool images as well as written descriptions. Stool form has been found to better correlate to intestinal transit time than stool frequency, even when altered by laxatives or constipating agents (Saad et al., 2010). In the literature pertaining to PD patients, the study by Sutton et al. (2007) was the only one to use the BSFS, recognising its simplicity and easy use; however, there was no commentary on the results. As the BSFS is readily available, its use in any future research on constipation should be highly considered.

**Implications for nurses**

Nurses need to become proactive in the management of constipation in PD patients through patient education, prevention strategies and the utilisation of currently available tools such as the Rome III criteria and the BSFS.

The importance of preventing constipation should be included in pre-dialysis education programmes promoting early patient awareness. Prior to commencing PD, the patient's bowel patterns should be clearly identified using the Rome criteria and BSFS. What the patient perceives to be a normal bowel action for them in the pre-dialysis stage may not be sufficient to maintain dialysate flows and prevent constipation. The aim is not necessarily for increased bowel movements but for achieving a stool consistency type as per the BSFS.

Patients already on PD need to be individually assessed on a routine basis on their daily bowel pattern and have an established bowel regimen to prevent complications associated with constipation. Patients should be encouraged to refer to the BSFS to identify their stool form routinely and be proactive in their laxative use; this will avoid relying on the patients' perception of constipation and their laxative requirements as has been identified in the literature.

Patients on PD may not necessarily require dietary fibre restrictions; therefore, nurses should ensure PD patients are referred to a dietician for their individual needs.

**Conclusion**

Constipation can have serious consequences for PD patients; however, there has been little research on best management in this group. Patients on PD are at increased risk of constipation because of fluid or diet restrictions, the use of unavoidable medications such as phosphate binders and their increased age.
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Information on chronic constipation management in the general population is helpful; however, research is required involving patients on PD, taking into account their specific requirements or restrictions. Current studies on constipation in PD patients are limited and provide little information on management for this particular patient group. Further research needs to be undertaken to establish best management options with regard to the study design, ensuring adequate patient numbers and the use of tools, such as the Rome criteria and the BSFS, to provide more consistent information and credible data.

While laxative use in PD patients is common, more information is required on their safety and efficacy when used in patients on dialysis. Patient assessment in the pre-dialysis stage using the Rome criteria and BSFS will establish patients’ current bowel habits, raise awareness of the potential risk of constipation and provide opportunity for early intervention. Raising patient awareness and encouraging daily use of the BSFS may prevent having to deal with constipation when it becomes a problem and interferes with the dialysis procedure. Avoiding the devastating complications of constipation in PD patients will require health professionals and patients themselves to have an awareness and understanding of the problem.

References


