A defined peritonitis clinical pathway in the emergency department improves outcomes for peritoneal dialysis patients

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Abstract

Background Peritonitis is the most common infection and cause of treatment failure for patients receiving peritoneal dialysis (PD). Peritonitis can be life-threatening if treatment is not initiated in a timely manner. We have identified in our facility that patients presenting to the emergency department (ED) with peritonitis often have delayed treatment. This could be due to a lack of understanding from ED clinicians and/or poor communication between ED and the renal department. Therefore, a local clinical pathway was developed to optimise peritonitis patient care.

Aims To evaluate the effectiveness of a local peritonitis clinical pathway designed to reduce time for patients with PD-related peritonitis receiving their first antibiotic treatment.

Setting All patients with PD peritonitis presenting through a tertiary hospital ED.

Main outcome measured Time for patients with PD-related peritonitis receiving their first antibiotic treatment in hospital.

Results The average time for peritonitis treatment decreased from 6 hours and 49 minutes to 5 hours and 18 minutes after the clinical pathway was implemented. Currently there is no published data to benchmark our result, even though the results indicated that the local clinical pathway may have been effective.

Implications for clinical practice Since the implementation of this project, three patients were able to be safely discharged from ED without needing hospital admission and this is due to prompt management and good communication between ED and the renal department. Delayed treatment not only causes increased demand in ED service, but also results in unnecessary hospital admission, which impacts on both the patient and the overall health care system.

Keywords

Emergency department, ED, peritoneal dialysis, PD, peritonitis.

Introduction

There are many reasons a renal dialysis patient presents to an emergency department (ED); it depends on the dialysis modality and its complications. For example, shortness of breath (SOB) is the most common and significant complication for haemodialysis patients; whereas peritonitis remains the most common cause of hospitalisation for peritoneal dialysis (PD) patients (Gadola *et al.*, 2008).

The increasing population of renal dialysis patients has raised the awareness of emergency physicians of the common problems that bring a dialysis patient to ED (Venkat, Kaufmann & Venkat, 2006). However, our internal incident investigation identified many incidents associated with peritonitis treatment in the ED which has raised the question of how familiar are ED physicians with PD treatment? The common example identified through our internal investigation is that of ED physicians mistaking a PD catheter for a suprapubic catheter; consequently PD samples were collected under an incorrect procedure, increasing the risk of peritonitis.

For this reason, it is recognised in our facility that renal physicians need to understand the challenge ED physicians face and assist in recognising significant symptoms that need immediate dialysis intervention, to ensure patient care is delivered in a safe and timely manner.

PD patients in ED

A study conducted by Fried, Bernardini, Johnston and Piraino in America (1996) indicated that even though peritonitis is not

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often directly linked to patient mortality, some serious pathogens such as fungal peritonitis or gram-negative bacteria do have a significant impact on a PD patient's survival.

Many patients with mild peritonitis can be managed as outpatients with antibiotic treatments and adequate support from the nephrology service; however, for severely ill patients, hospitalisation or urgent surgical intervention for catheter removal may be needed to avoid septicaemia (Venkat, Kaufmann & Venkat, 2006). Particularly with *Staphylococcus aureus* infection, delayed treatment can cause peritonitis-related sepsis, which is the leading cause of death in patients with peritonitis-related mortality and majority of patients will require intensive care unit (ICU) admission (Fontan, Carmona, Naveiro, Rosales, Villaverde, & Valdes, 2005). When a dialysis patient requires ICU intervention, the overall prognosis is usually poorer and mortality higher compared with a non-dialysis patient requiring ICU intervention (Manhes, Heng, Aublet-Cuvelier, Gazuy, Deteix & Souweine, 2005). Therefore, it is imperative for a PD patient to receive adequate treatment in a timely manner to avoid further complications.

Current internal audits in our facility indicated that the time taken from the patient presenting at the hospital to receiving initial antibiotics for a PD-related peritonitis patient varied between 45 minutes and 1606 minutes (>26 hours); the average time taken to administer initial antibiotics in our facility was 409 minutes (>6 hours).

The recent statewide "sepsis skills" program, the aim of which is to reduce preventable harm to patients through improved recognition and management of severe infection and sepsis, recommended the first antibiotics should be administered under 60 minutes (Clinical Excellence Commission, 2013). It was, therefore, recognised by our local renal and ED teams that a clinical pathway is needed to reduce the time that a patient presenting to ED with peritonitis receives their first dose of antibiotics.

Development of local clinical pathway

The clinical pathway was developed by a multidisciplinary team of senior clinicians, clinical nurse consultants and managers from both the ED and renal departments. The underlying issues were discussed between the two teams and the causes of delay were identified as:

1. Delay in notifying ED when an on-call PD nurse refers a patient to present to ED, ED staff were not notified or given handover — which also caused delay in triage and notifying the renal unit.

2. Delay in sample collection — due to the need to rely on PD-trained staff from the renal unit.

3. Delay in deciding appropriate antibiotics treatment — with a need for clear steps for diagnosis and treatment. Once the diagnosis is made, evidence has shown intra-peritoneal (IP) antibiotics to be more superior in treating PD-related peritonitis over intravenous (IV) antibiotics (Lye, 2004; Wiggins, Craig, Johnson & Strippoli, 2010). Therefore, further delays can occur due to IP antibiotics only being able to be administered by a trained PD staff. The clinical pathway was developed to address all causes of delay and it comprised two parts: the guideline that clearly outlines the required communication channel between the ED and the renal department, and the flow chart that allows ED clinicians to categorise patients' condition, and initiate the appropriate management plan (Appendix 1).

Data analysis

The local clinical pathway was implemented at the end of December 2011, and the data was analysed 12 months after implementation. The report of peritonitis patients who presented to ED was firstly summarised by running internal software using ED diagnosis code of "peritonitis". The data is further analysed by reviewing each individual patient's medical record on digital medical record (DMR) to filter PD-related and non–PD related peritonitis. Critically ill patients who required ICU interventions were also excluded from the data, because, for this group, stabilising patients haemodynamically is the priority over peritonitis treatment.

Patients

The total number of PD patients with peritonitis presenting through ED in 2011 (12 months prior to the implementation of the clinical pathway) was 34 according to ED diagnosis code, of which 23 had PD-related peritonitis. Twelve months after implementing the local clinical pathway in 2012, the numbers of PD-related peritonitis was 14 out of 23 ED diagnosis code of patients with peritonitis.

The time frame for patients receiving the first peritonitis treatment in hospital is identified through DMR, and calculated from the time the patient was assessed by the ED physician to the time the patient received the first dose of antibiotics. The antibiotics could either be administered in ED or on the ward by trained PD nurses.

Outcomes

The average time for a PD patient to receive the first antibiotics treatment has decreased from 6 hours and 49 mins (409 mins ± SD 360), to 5 hours and 18 minutes (318 mins ± SD 195) 12 months post-implementation. A total of 91 minutes' reduction in waiting time was observed only 12 months after the implementation of the local clinical pathway (Graph 1).

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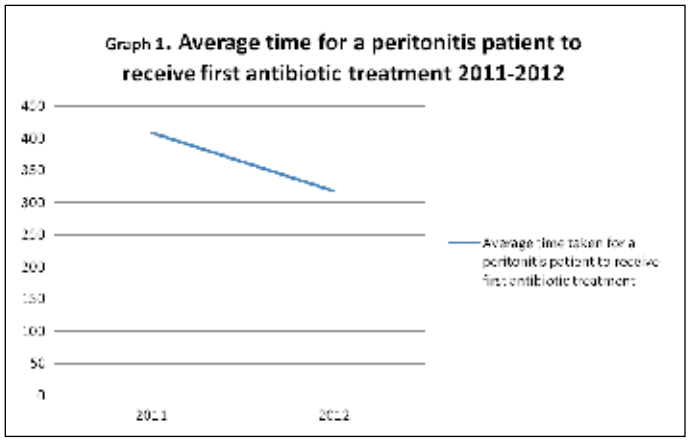

Discussion

Infection remains the major leading cause of death for both PD and haemodialysis patients (ANZDATA, 2012). While catheter-related infection is emphasised in literature for haemodialysis patients, peritonitis should be treated like catheter-related infection with a sense of urgency to avoid unnecessary hospital admission and severe septicaemia. A study conducted by Aslam, Bernardini, Fried, Burr and Piraino in 2006 found that PD and haemodialysis patients had a similar infection rate; therefore, it is important for nephrology clinicians to monitor peritonitis treatment as key clinical indicators, just as they would for catheter-related infection.

The data collected thus far shows the effectiveness of the clinical pathway in reducing time taken to administer the first antibiotic treatment for peritonitis patients presenting to ED in our local facility. Despite the limitation of this analysis including a small number of patients, the possibility of introducing a "sepsis kill" program in ED and short monitoring period, this will be the ongoing direction for the author's team to work on to evaluate the sustainability of the clinical pathway.

In terms of patient outcomes, the length of hospital stay was analysed to compare patient groups in 2011 and 2012. Even though the retrospective chart audit did not show a significant difference in length of hospital stay between the two groups (8 days vs 7 days), it did show a significant decrease in number of patients who required ED intervention and hospital admission. Prior to implementing the clinical pathway, there were 23 peritonitis patients who required ED intervention and hospital admission. Twelve months post-implementation of the clinical pathway, there were only 14 ED presentations and three out of 14 were successfully managed/discharged from the ED without needing hospital admission. This result has demonstrated that with good communication and prompt management between ED and the renal department, peritonitis can be managed more efficiently, which means less need for ED service and hospital beds.

The International Society for Peritoneal Dialysis (ISPD) guideline recommends that every organisation should have a management plan for peritonitis, especially for the initial presentation and management, to preserve peritoneum membrane function (ISPD, 2010). Jose *et al.* (2011) further emphasise the importance and the need for all PD units to record infection rates and outcomes to benchmark against international guidelines. Thus, besides peritonitis protocols, the author would like to stress the need for a local clinical pathway to facilitate communication between the ED and the renal department. The time of administrating the first antibiotic treatment should also be one of the clinical key indicators that every PD unit collects, so that good practice can be learned from the leading units.

Future research should have an emphasis on the effect of delayed treatment in peritonitis and patients' mortality, as there is currently a lack of evidence in this field. Like the peritonitis rate, there should be a minimum acceptable time for a peritonitis patient to receive their first antibiotics treatment for all units to benchmark their data against.

Conclusion

Peritonitis can be a life-threatening condition if it is not managed in a timely manner. Despite limitations, this project has shown the possibility of how a local clinical pathway can facilitate effective communication between the ED and the renal department, thereby reducing the time taken for a PD-related peritonitis patient presenting to ED receiving their first dose of antibiotics. This project has also highlighted the need for each hospital to collect the average time taken for peritonitis patients to receive their first antibiotics treatment, so the practice can be benchmarked and improved.

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*Staff who prearranged patients to present to ED should contact **ED NUM (#xxxx)** and **nephrology in charge nurse (#xxxx)** to avoid unnecessary waiting time and admission.

*Renal in charge nurse is to be contacted by ED to facilitate bed allocation by liaising with ED NUM and bed manager once the decision for admission is made.

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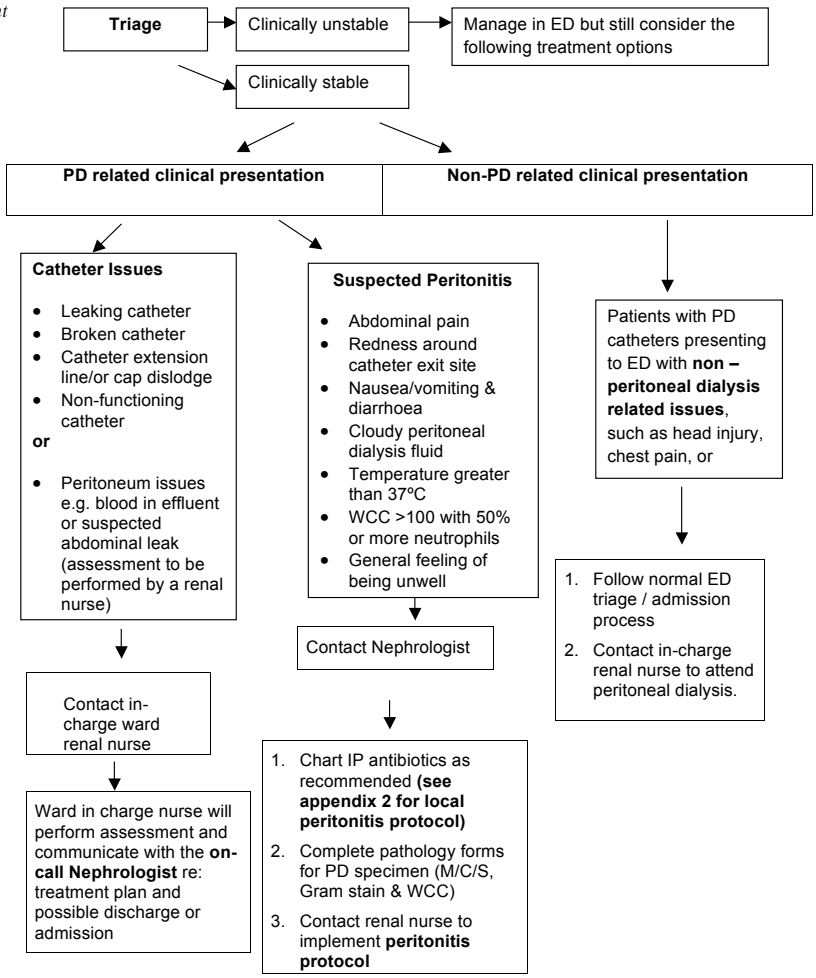
Appendix 1: Flow chart for management of patients with PD presenting to John Hunter Hospital ED



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