The effect of an evidence based bowel protocol on time taken to return to normal bowel function in post operative total hip and total knee replacement patients

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Chapter 1 - Introduction

Background and Context

Total hip and total knee replacements are one of the most commonly performed major orthopaedic procedures undertaken in Australia with over 80,000 operations performed in 2011 (Australian Orthopaedic Association, 2012). The Australian Orthopaedic Association (2011) reported the increasing numbers of procedures, having risen 7.9% from 2009 to 2010. Of these, over 60% were undertaken in private hospitals (Australian Orthopaedic Association, 2011). These patients are at very high risk for developing constipation for multiple reasons including a change in diet, reduced fluid intake, pre-operative fasting, the advanced age of many, reduced mobility, the administration of a general anaesthetic and the administration of opioid based analgesia both intravenously and orally (Ho, Kuhn, & Smith, 2008; Schmelzer, 1990; Stumm, Thomas, Coombes, Greenhill, & Hay, 2001).

In 2009 a clinical audit was undertaken at St John of God Murdoch Hospital (SJGMH) after some major joint replacement patients required extended inpatient stays for management of severe constipation, and some patients had returned to the emergency department following discharge for management of faecal impaction. Follow up phone calls revealed increasing numbers of patients were experiencing symptoms of severe constipation after discharge. Bowel management was ad hoc and largely dependent upon the experience and aperient preference of the nurse or medical practitioner. The audit was based on the Practical Application of Clinical Evidence System (PACES) from the Joanna Briggs Institute (JBI) Adelaide. The JBI is the world’s largest provider of evidence based guidelines for nurses and allied health professionals and is based at the University of Adelaide in South
Australia. The audit confirmed that opportunities for improvement existed in orthopaedic bowel management across all four audit criteria:

1. baseline assessment of usual bowel pattern;
2. monitoring of bowel habits whilst an inpatient using a validated tool;
3. ongoing evaluation and management of constipation whilst an inpatient;
4. education and written information on constipation for patients and their carers.

St John of God Murdoch Hospital is a large private teaching hospital with 363 beds. It is one of nine surgical hospitals within the national St John of God Health Care group of 15 hospitals. A nursing research council teleconference conducted in December 2009 with representatives from all of the groups 15 hospitals also identified that post-operative constipation in the orthopaedic patient cohort was a common problem across other St John of God surgical hospitals.

Whilst there is a significant body of evidence discussing the scope of constipation in orthopaedic patients, no evidence exists to guide bowel management in this cohort. In response to this, a multidisciplinary team developed the Murdoch Bowel Protocol© (the intervention protocol used for this study), a bowel management tool based on generic best practice guidelines for constipation and including the Bristol Stool Chart (BSC) (Heaton & Lewis, 1997) which is a standardised instrument used to record stool type (Appendix A). The intervention protocol is largely based on the titrated administration of polyethylene glycol (PEG) with electrolytes and marketed in Australia as Movicol®. The dose of Movicol® is increased, decreased or ceased depending on the post operative day and stool type as self described by the patient using the BSC. The BSC classifies stool as one of
seven types with stool types 1 and 2 indicating a hard, constipated stool; types 3 and 4 are considered normal stools; types 5 and 6 indicate a loose stool and type 7 a completely liquid stool.

Incidence of Constipation

General population.
Much has been written in the literature about the incidence of constipation in the general population. Estimates range from 2% (Ramkumar & Rao, 2005) to 27% (Belsey, Geraint, & Dixon, 2010) with best estimates around 12-19% in the United Kingdom (Belsey, et al., 2010). This concurs with a large Australian study (Chiarelli, Brown, & McElduff, 2000) which found the constipation rate in the 18-23 year old age group was 14.1% but increased to 27.7% in the 70-75 year old age group. Literature from the United States of America (McCrea, Miaskowski, Stotts, Macera, & Varma, 2009) cites constipation as a common problem affecting up to 28% of the general population with a larger increase after the age of 70 years. As well as the incidence increasing with age, constipation is also more prevalent in women (Belsey, et al., 2010; McCrea, et al., 2009; Norton, 1996; Ramkumar & Rao, 2005; Spinzi et al., 2009) possibly as a result of pelvic floor injury (McCrea, et al., 2009) or pelvic floor dysfunction (Glia & Lindberg, 1997).

Incidence in orthopaedic patients.
Whilst rates of constipation in the general population are discussed above the incidence is significantly higher in the orthopaedic patient cohort with up to 64% of patients thought to be affected (Ishihara et al., 2012). Constipation is one of the most common gastrointestinal complaints suffered by this group (Ho, et al., 2008) who are at particularly high risk for developing constipation due to the advanced age of many patients (Davies, Green, Mottran, & Pirmohamed, 2008), reduced mobility (Linari, Schofield, & Horrom, 2011),
altered diet and fluid intake (Linari, et al., 2011) and the administration of opioid analgesia (Ho, et al., 2008; Kurz & Sessler, 2003; Linari, et al., 2011; Madsen, Magor, & Parker, 2010).

Causes

Whilst a common problem constipation is often considered banal and self limiting. However, opioids administered after major surgery are commonly associated with debilitating bowel dysfunction with restoration of bowel function an important part of post operative care. Normal bowel function relies on several factors: the coordination of motility via continuous electrical activity, mucosal transport and defecation reflexes (Kurz & Sessler, 2003). Although well recognized as highly effective analgesics, opioids act on neural receptors in the stomach, small and large intestine with multiple clinical effects. In the stomach this results in decreased gastric motility and pyloric tone that can produce nausea, anorexia and vomiting (Kurz & Sessler, 2003). In the small intestine effects include decreased pancreatic and biliary secretion, reduced propulsion and increased fluid absorption which results in delayed absorption of medications, hard dry stool and delayed digestion. Large intestinal effects include straining, feelings of incomplete evacuation, bloating, abdominal distention, constipation and abdominal cramps (Kurz & Sessler, 2003).

Complications

Complications of constipation include abdominal discomfort, nausea, anorexia, urinary retention, faecal impaction and paralytic ileus (Davies, et al., 2008; Hall, Karstens, Rakel, Swanson, & Davidson, 1995; Linari, et al., 2011; Miaskowski, 2009; Schmelzer, 1990) which often necessitates use of laxatives, enemas and occasionally surgery. Length of stay may be increased to manage constipation with some patients requiring readmission to hospital
for management of faecal impaction and faecal incontinence (Kurz & Sessler, 2003; Madsen, et al., 2010; Pappagallo, 2001; Petticrew, Watt, & Sheldon, 1997; Schmelzer, 1990; Stumm, et al., 2001). Symptoms are often so severe that patients would rather tolerate severe pain than continue to take constipation causing analgesia (Camilleri, 2011; Holzer, 2008; Kurz & Sessler, 2003; Panchal, Muller-Schwefe, & Wurzelmann, 2007). Further, deaths have been reported in both adults and children as a result of complications arising from constipation induced faecal impaction and bowel obstruction (Chute, Cox, Archer, Bready, & Reiber, 2009; Government of Western Australia, 2009; Hibbard, Propst, Frank, & Wyse, 2009; Leven, Barrett, & Mendelowitz, 2002; Singh, Arbuckle, Little, & Manglick, 2004).

Statement of Purpose
Initially the primary purpose of the study was to investigate the effect of the Murdoch Bowel Protocol© on the time taken for patients who underwent a shoulder, knee or hip replacement to return to normal bowel function. However as only three patients who underwent a shoulder replacement operation were recruited, biostatistical advice was sought. This advice confirmed that inclusion of data from these participants would likely prevent the convergence of coefficients and cause spurious results. Further advice was to remove these participants from the total sample following baseline comparison of group variables and that doing so would have no impact on the final results. The study also sought to determine whether differences in the following variables influenced the time taken for these patients to return to normal bowel function: age; gender; length of pre operative fasting; anaesthetic type (general, regional; general + regional) and operation type.

Hypotheses
The hypotheses for this study reflect the revised Statement of Purpose.
Null hypothesis:
There is no difference in bowel function post knee or hip replacement between patients who receive the study bowel protocol and patients who receive standard bowel management.

Directional hypothesis:
Patients who undergo a knee or hip replacement and receive the Murdoch Bowel Protocol will experience a statistically significant reduction in time taken to return to normal bowel function compared with patients who receive standard bowel management.

**Definition of Terms**

**Constipation.** The Rome II diagnostic criteria for functional constipation uses the following definition (1999):

At least 12 weeks (which need not be consecutive in the preceding 12 months) of **two or more** of the following:

1. straining >1/4 of defaecations;
2. lumpy or hard stools >1/4 of defaecations;
3. sensation of incomplete evaluation >1/4 of defaecations;
4. sensation of anorectal obstruction/blockage >1/4 of defaecations;
5. manual manoeuvres to facilitate >1/4 of defaecations (e.g. digital evacuations, support of the pelvic floor); and/or
6. <3 defaecations per week.

The World Gastroenterology Organisation (2007) defines constipation using the Rome Criteria described below. Constipation must include **two or more** of the following:

- fewer than three bowel movements per week;
- hard stool in more than 25% of bowel movements;
• a sense of incomplete evacuation in more than 25% of bowel movements;
• excessive straining in more than 25% of bowel movements;
• a need for digital manipulation to facilitate evacuation.

Rome III diagnostic criteria for functional constipation (2006):

1. Must include two or more of the following:
   a. straining during at least 25% of defaecations;
   b. lumpy or hard stools in at least 25% of defaecations;
   c. sensation of incomplete evacuation for at least 25% of defaecations;
   d. sensation of anorectal obstruction/blockage for at least 25% of defaecations;
   e. manual manoeuvres to facilitate at least 25% of defaecations (e.g., digital evaluation, support of the pelvic floor);
   f. fewer than three defaecations per week.

2. Loose stools are rarely present without the use of laxatives;

3. Insufficient criteria for irritable bowel syndrome.

**Bristol Stool Chart (BSC).** A medical aid designed to classify the form of faeces into seven groups. It was developed by K. W. Heaton and S. J. Lewis at the University of Bristol and was first published in the Scandinavian Journal of Gastroenterology in 1997 (Heaton & Lewis, 1997). The form of the stool depends on transit time in the colon and ranges from type 1 (separate hard lumps which are hard to pass) to type 7 (watery with no solid pieces) (Appendix A). For the purpose of this study constipation was defined as a Bristol Stool Chart type 1 or 2, normal stool as types 3 or 4, and loose stool as types 5, 6 or 7.

**Gold Standard.** "Any standardised clinical assessment, method, procedure, intervention or measurement of known validity and reliability which is
generally taken to be the best available, against which new tests or results and protocols are compared.” (Segen’s Medical Dictionary, 2012).

**Arthroplasty.** Joint replacement with a prosthesis usually made of plastic and metal (Segen’s Medical Dictionary, 2012).

**Opiate.** Drugs derived from opium (Segen’s Medical Dictionary, 2012).

**Opioid.** Any synthetic narcotic that has opiate-like activities but is not derived from opium (Segen’s Medical Dictionary, 2012).

**Significance**

Post-operative analgesia-related constipation is a very common problem which may necessitate an increased length of stay and lead to significant morbidity and occasionally mortality. The challenge of preventing this complication has long been recognised in the clinical setting resulting in administration of ad hoc bowel interventions that are not supported by empirical evidence. The baseline work of the researcher conducted prior to this study resulted in the development of a novel and simple nursing intervention known as the Murdoch Bowel Protocol© (the Protocol). Although a clinical audit post development and implementation of the Protocol showed a reduction in morbidity related to opioid induced constipation in patients who had undergone major joint replacement surgery, the intervention has not been rigorously tested and there is a lack of empirical evidence to support its routine use in nursing practice. This study was the next logical step as it would complete the development, testing and evaluation cycle for the Protocol.

Nurses are in a key position to provide care that can minimise development of common complications such as post-operative constipation. Not only is this complication distressing and uncomfortable for patients, it has a number of nursing and other resource implications. The findings from this study will
have implications not only for nurses, but for clinical practice generally as the care of patients experiencing opioid-related constipation is not restricted to post-operative patients and has relevance to the care of patients who receive opioid analgesia for chronic conditions requiring short and longer term analgesia. As a consequence the study has significance across four main areas:

- minimising or preventing increased length of inpatient stay for the management of constipation in patients who undergo major joint replacement surgery;
- preventing readmission of these patients to hospital for management of faecal impaction;
- improved use of nursing resources currently used to manage analgesia related constipation; and
- improved education of patients, carers and health professionals regarding the prevention of analgesia-related constipation.

Summary of the Chapter and Organisation of Thesis

This initial chapter has provided the introduction, background, purpose, hypothesis and significance of the study. The relevant literature is discussed in Chapter 2, the frame of reference supporting this study is described in Chapter 3, methods and procedures are presented in Chapter 4 and data analysis and findings in Chapter 5. The discussion is presented in Chapter 6, followed by conclusions, recommendations and implications for practice and future research in Chapter 7.