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ORIGINAL ARTICLE

Diarrhoea risk factors in enterally tube fed critically ill patients: A retrospective audit

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Summary
Objective: Diarrhoea in the enterally tube fed (ETF) intensive care unit (ICU) patient is a multi-factorial problem. Diarrhoeal aetiologies in this patient cohort remain debatable; however, the consequences of diarrhoea have been well established and include electrolyte imbalance, dehydration, bacterial translocation, peri anal wound contamination and sleep deprivation. This study examined the incidence of diarrhoea and explored factors contributing to the development of diarrhoea in the ETF, critically ill, adult patient.
Method: After institutional ethical review and approval, a single centre medical chart audit was undertaken to examine the incidence of diarrhoea in ETF, critically ill patients. Retrospective, non-probability sequential sampling was used of all emergency admission adult ICU patients who met the inclusion/exclusion criteria.
Results: Fifty patients were audited. Faecal frequency, consistency and quantity were considered important criteria in defining ETF diarrhoea. The incidence of diarrhoea was 78%. Total patient diarrhoea days ($r = 0.422$; $p = 0.02$) and total diarrhoea frequency ($r = 0.313$; $p = 0.027$) increased when the patient was ETF for longer periods of time. Increased severity of illness, peripheral oxygen saturation (Sp02), glucose control, albumin and white cell count were found to be statistically significant factors for the development of diarrhoea.
Conclusion: Diarrhoea in ETF critically ill patients is multi-factorial. The early identification of diarrhoea risk factors and the development of a diarrhoea risk management algorithm is recommended.

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Introduction

Diarrhoea in the enterally tube fed (ETF) critically ill patient is a frequently experienced and multi-factorial problem (Thorson et al., 2008). Although rarely associated with mortality, diarrhoea is distressing to patients, visitors and staff (Martin, 2007).

Enteral tube feeding is often debated as a main cause of diarrhoea (Lee and Auyeung, 2003; Ukleja, 2010). Approximately 46—77% of all critically ill patients will receive enteral nutrition (EN) during their intensive care unit (ICU) admission (McKenna et al., 2001; Lee and Auyeung, 2003; Gramlich et al., 2004; Whelan et al., 2006; Whelan, 2007). The early commencement of EN is suggested to preserve the gut's immunological barrier, reduce bacterial translocation, reduce sepsis and multi-organ failure and improve wound healing (Davies and Bellomo, 2004; Marshall and West, 2004; Artinian et al., 2006; Nguyen et al., 2007; Lopez-Herce et al., 2008; Lopez-Herce, 2009; McClave and Heyland, 2009; Ukleja, 2010).

Incidence of diarrhoea

The reported incidence of ETF diarrhoea is suggested to vary between 2% and 68% (Bengmark, 2002; McNaught et al., 2005; Weisen et al., 2006; Luft et al., 2008; Whelan et al., 2009). However, diarrhoea in ETF critically ill patients is more diverse with the reported incidence varying between 2% and 95% of all patients (Whelan et al., 2009). The variability of diarrhoea incidence depends on the diagnostic criteria and definitions used to identify and quantify diarrhoea (Lopez-Herce, 2009).

Causes of diarrhoea in the ETF patient

Diarrhoea in ETF patients has previously been associated with physiologic responses to critical illness, altered colonic responses to intragastric feeding, microbial contamination of the ETF formulae, sterile ETF formulae, constant flow administration of ETF formulas, low fibre ETF formulas, hypoalbuminaemia, disturbances to intestinal flora, increased exposure to antibiotics, and concurrent pharmacotherapy such as aperients, prokinetics and histamine-2 medications (Weisen et al., 2006; Ferrie and East, 2007; Sabol and Carlson, 2007; Whelan, 2007; Lopez-Herce, 2009; Btaiche et al., 2010). In addition, the diagnosis, severity of illness and co-morbidities of patients can contribute to diarrhoea in critically ill patients (Thorson et al., 2008).

Diarrhoea management strategies

Inconsistent diarrhoea management practices are evident between different ICU's (Dorman et al., 2004; Ferrie and East, 2007). Strategies to manage ETF related diarrhoea include diarrhoea management algorithms, anti-diarrhoeal medications, electrolyte and fluid replacement, continuation of ETF, administration of probiotics, prebiotics and synbiotics, and the administration of glycopeptides and metronidazole for infectious diarrhoea (Whelan et al., 2006; Lopez-Herce, 2009). It could be argued that the variations in bowel care management strategies in ICU lead to diarrhoea in critically ill patients.

It was noted that the reported incidence of ETF related diarrhoea in critically ill patients is well established in regards to interventional research such as administration of fibre containing ETF formulas and probiotics (Bleichner et al., 1997; DeMao et al., 1998; Lee and Auyeung, 2003; Whelan et al., 2006; Lopez-Herce, 2009). However, there remains a paucity of literature addressing the incidence and frequency of diarrhoea in ETF critically ill patients in relation to ETF formulae, relationships between diarrhoea incidence and duration, hypoalbuminaemia, infection, antibiotic therapy and concomitant pharmacotherapy within in a single centre, tertiary referral ICU.

Methods

A 5-month, retrospective, repeated measures cohort study was undertaken.

Study aims and research questions

The primary aim of this study was to examine the relationships between ETF and diarrhoea in a single centre ICU. This study informed a larger, single centre cohort study that examined diarrhoea risk factors in critically ill patients. The research questions that guided this study include:

1. What is the incidence of ETF diarrhoea in the ICU?
2. Is the duration and incidence of diarrhoea related to the type of ETF administered?
3. Is the duration and incidence of diarrhoea related to the duration of ETF?
4. Do patients develop diarrhoea when the commencement of ETF is delayed?
5. Is diarrhoea incidence and duration influenced by age, gender and Acute Physiology and Chronic Health Evaluation (APACHE II) scores?
6. Does the duration of antibiotic therapy, aperients, prokinetic, sedation and neuromuscular blockade medication administration affect the incidence and duration of diarrhoea?
7. Is diarrhoea related to hypoxia, hypoalbuminaemia, hypoglycaemia and elevated white blood cell counts?

Setting

The research setting was a twenty-two bed, single site, Level III ICU of a major teaching and tertiary referral, metropolitan hospital in Brisbane, Australia. A Level III Australian ICU is a tertiary referral unit that provides comprehensive critical care services for critically ill patients who require multi-system life support for indefinite periods of time. These ICUs also demonstrate a commitment to academic education and research (Joint Faculty of Intensive Care Medicine (JFICM), 2003).