Managing Diarrhoea in the Intensive Care Unit

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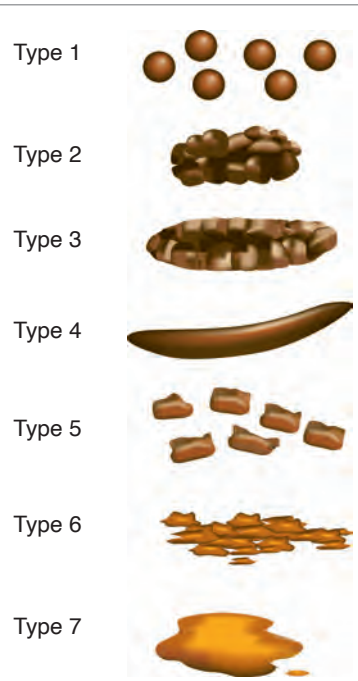
Diarrhoea during critical illness is a common issue with multifactorial influences.[1] Supported by the current evidence-base, this article aims to outline the impact of diarrhoea in the adult intensive care unit (ICU), explore potential causes and discuss the management strategies commonly used in practice. After diagnosis, a process of systematic investigation to identify aetiology will begin. If available, Trust specific guidance should be sought locally from the Trust's diarrhoea policy to determine course of action.

Diagnosis & incidence

There is variation in the diagnostic criteria used by ICUs as to what constitutes 'diarrhoea'[1] and as a result, its reported incidence is wide, ranging from 2-98%.[2] The World Health Organization defines diarrhoea as the passage of ≥3 loose or liquid stool per day.[2] However, this definition does not consider volume or gastrointestinal transit time and it is rarely used as silo in clinical practice.[3] A 2019 systematic review identified a consensus definition among ICUs to be ≥3 loose or liquid stools per day, each with a volume >200-300 ml.[1]

The Bristol Stool Chart (see **Figure 1**) is a frequently used clinical tool to monitor stool consistency/type.[3] The chart classifies stools into 7 types, with type 6 and type 7 classified as 'diarrhoea'.[3] Brief descriptions and pictorial examples of each stool type explain consistency, thus providing a visual guide for clinicians which reflects gastrointestinal transit time.[3] The type of stool, in conjunction with consideration of frequency and volume, assists clinicians to diagnose along the spectrum of bowel movement disorder, from constipation to diarrhoea.[3]

Figure 1: The Bristol Stool Chart



Impact

Diarrhoea complicates the care of unstable patients and has detrimental effects on the patient and healthcare providers alike (see **Table 1**).[1]

Potential causes

Infection

Viral and bacterial infections can cause diarrhoea and are often suspected to be the culprits.[3, 4] Once diarrhoea is detected, it is common practice for a stool sample to be sent to the lab which investigates for the presence of infectious agents.[3, 4] Literature suggests that in practice, few samples show a positive result for infection.[4] A 2019 study completed in London, UK, identified only 6.5% of stool samples receive a positive result for pathogens.[4] Of these positive assays, the most common infective agent was *Clostridium difficileantigen* positive (76.9%), followed by *Clostridium difficileantigen* negative (15.4%) and finally *Campylobacter* (7.7%).[4]

Prophylactic laxative bowel regimens

Ironically to this article, critically ill patients are at risk of constipation.[6] This is related to several factors, including mechanical ventilation, physical immobility and opioid use.[6] With the aim to avoid constipation and its associated complications, laxative bowel regimens are often commenced as routine practice during the first three days of ICU admission.[6]

Due to the lack of clinical guidance and gold standard consensus, laxative regimens vary between ICUs in terms of pharmacological agents, dose and timing of administration.[1] However, an osmotic laxative (e.g. lactulose) is commonly used, at times in conjunction with other types of laxatives such as stool softeners (e.g. docusate) and/or a stimulant laxative (e.g. senna).[1, 6] A 2024 study concluded that diarrhoea incidence did not significantly increase with administration of single or dual-therapy prophylactic laxative bowel regimens.[6] Authors did not hypothesise why this seemed to be the case and concluded that further research is required.[6]

In the occurrence of diarrhoea, continued administration of a prophylactic laxative bowel regimen may be overlooked by the multidisciplinary team (MDT), so should be highlighted if noticed in the dietetic assessment.

Pharmacology

Due to direct contact with the gastrointestinal tract, many pharmacological agents influence stool output which may be inadvertent to their intended purpose. Antibiotics, prokinetics, diuretics, potassium replacement, metformin and stimulant glycerin suppositories are each independently associated with increased likelihood of diarrhoea occurrence.[2, 4, 7-9] Evidence shows that each day of antibiotic therapy increases the likelihood of diarrhoea by 10%.[2] Considering the adverse effects of diarrhoea outlined in **Table 1**, this highlights the importance of appropriate prescription of antibiotic agents and minimising the number of antibiotic days.[2] Broad-spectrum antibiotics, such as clarithromycin, destroy beneficial host gut bacteria leading to dysbiosis and this imbalance of intestinal flora can result in diarrhoea.[5, 9]

Enteral nutrition

European guidelines advise to commence enteral nutrition within the first 48 hours of ICU admission when oral intake is not possible.[10] Due to sedation and mechanical ventilation, this is often the case.

Enternal nutrition (EN) directly interacts with the gut microbiome and is therefore likely to influence stool output.[3] For example, if an enteral feed contains ingredients derived from the patient's known allergens or intolerances, such as milk protein, it may elicit a gastrointestinal response, including diarrhoea.

Table 1: Adverse effects associated with diarrhoea[1, 4, 5]

Patient-related	Healthcare provider-related
• Malabsorption of nutrients and pharmacological agents • Dehydration and electrolyte disturbances related to increased losses • Malnutrition • Gut microbiome dysbiosis • Skin breakdown with high risk for infection related to incontinence • Psychological distress related to feelings of embarrassment or compromised dignity • Social isolation if nursed in a single-occupancy room • Longer ICU and hospital length of stay	• Increased workload • Increased use of consumables (e.g. hygiene and continence products) • Increased costs associated with investigating aetiology (e.g. collection and processing of stool samples to investigate infection) • Use of sparse single-occupancy rooms to adhere to isolation infection control measures • Risk of transmission to staff if contagious aetiology, resulting in sick days

Other EN-related factors which may influence stool frequency, consistency and volume include:

- The energy-density, osmolarity, fibre content and fat composition of the feed[11]
- The rate, temperature and mode of infusion[11]
- Contaminated enteral feed[11]
- The terminal position of the enteral feeding tube (gastric *vs.* small intestine).[8]

Observation studies have shown EN does not increase the likelihood of diarrhoea or constipation.[7] However, without clinical evidence EN is often suspected to be the cause of loose stool and, as a result, feed may be discontinued by the medical team without dietetic input.[3] This exacerbates negative energy and protein balance in a vulnerable population and increases the likelihood of nutrient deficiencies, muscular wastage and ICU-acquired weakness.[3, 12]

Clinical diagnosis

The patient's clinical diagnosis and/or comorbidities may be an underlying contributor to the diarrhoea. For example, a malabsorptive condition such as pancreatic exocrine insufficiency, short-bowel syndrome or active inflammatory bowel disease (Crohn's or ulcerative colitis), can result in diarrhoea/steatorrhoea.[4] Inadequate blood flow to the gut during sepsis means that diarrhoea is frequently observed in this patient population.[8] Furthermore, respiratory failure, haemodynamic instability and a greater degree of organ failure are each associated with increased likelihood of diarrhoea occurrence.[7] Due to the severity of critical illness, it is likely that these patients will experience a long duration of ICU admission and, consequently, more exposure to other risk factors discussed above.[7]

Interestingly, some populations are associated with reduced occurrence of diarrhoea and constipation is frequently observed in major trauma patients.[7] This is particularly the case with those admitted with acquired brain and/or spinal cord injuries.[7] This may be related to prolonged mechanical ventilation, analgesic sedation, opioid use and physical immobility.[7]

Vigilant attention to concurrent red flag symptoms such as blood in stool, rectal bleeding and unintentional weight loss should be paid by the MDT.[13] Presence of these symptoms or a recent history of foreign travel may indicate an underlying, perhaps undiagnosed, cause.[13]

Management

The underlying aetiology of diarrhoea will dictate appropriate and effective treatment.[8] Often in clinical practice, a combination of the management strategies discussed below are implemented by the MDT.

Rehydration and electrolyte correction

Excessive water and electrolyte loss is a consequence of diarrhoea, which can be fatal.[13] The National Institute for Health and Care Excellence (NICE) guidance advises to commence IV or oral rehydration therapy in patients with acute diarrhoea.[13] Prevention and reversal of fluid and electrolyte depletion is fundamental to restore stability in the vulnerable ICU population.[13]

Infection prevention and control (IPAC)

When diarrhoea is caused by infection, prompt action is key to reduce the risk of transmission.[5] Referral to the IPAC team should be completed and stringent hand hygiene with soap and water should be implemented by all staff and visitors.[5] Patients may be isolated to a single-occupancy room. Signage at the point of entry to the room and discussions at handover improve communication and awareness among the MDT about the necessary infection prevention measures. With advice from IPAC, clinicians should use personal protective equipment, such as gloves and aprons, for patient contact and change soiled bedding. Mobile patients should be instructed to use a designated toilet, ideally the en-suite of their room or a facility close by. Diligent adherence with IPAC advice reduces the risk of disease spread.

Faecal management system

To maintain hygiene in the presence of persistent incontinent diarrhoea, insertion of a faecal management system is an established and recommended practice.[2, 8] A silicone tube is inserted into the patient's rectum which diverts faeces into a drainage bag.[8] This reduces exposure of the patient's skin to irritants, consequently reducing the risk of pressure damage and infection.[8] Additionally, faecal management systems enable clinicians to accurately monitor stool volume, measure fluid balance and identify when symptoms improve.

Pharmacology

Pharmacists and other prescribing clinicians may discontinue medications known to exacerbate stool output, for example, laxatives and prokinetics.[2] Unless contradicted, the MDT may commence anti-diarrhoeals such as loperimide or codeine sulphate.[8] These medications reduce gut peristalsis and motility.[8] Consequently, this increases gastrointestinal transit time which thickens stool consistency and reduces frequency of defecation.[8]

If aetiology is confirmed by a low faecal elastase assay to be pancreatic exocrine insufficiency, a semi-elemental enteral feed should be considered. Depending on the severity of insufficiency, pancreatic enzyme replacement therapy may also be required.[14]

Dietetic interventions

Aiming to ease symptoms and optimise nutrient bioavailability, several adjustments could be made to the dietetic care plan.

For patients requiring EN, reducing the energy density and osmolarity of the feed may aid tolerance.[8] The small intestine typically does not tolerate high-osmolarity feed, therefore selecting a lower-osmolarity formula for patients fed post-pylorically is likely to reduce risk of symptoms.[8] Altering the modality of EN may also help.[5, 8] Reducing the rate of infusion, opting for a slow, continuous infusion over 24 hours can reduce diarrhoea occurrence compared to bolus regimens.[8] As a preventative measure, literature advises to avoid a rate of infusion >100 ml/hr.[5] Evidence shows that fibre-supplemented EN to be significantly associated with a reduction in diarrhoea incidence in ICU populations.[15]

If an underlying malabsorptive condition is suspected to be the cause of diarrhoea, modifying the protein composition of the feed by switching from a standard, polymeric feed to peptide formula may also aid tolerance.[8] Alternatively, switching to a formula which contains medium-chain fatty acids may help to relieve diarrhoea severity.[8]

For patients who are able to consume an oral diet, advice to reduce or increase fibre intake may improve symptoms.[8] In addition, if they are prescribed oral nutritional supplements, switching from a standard product to peptide formula may improve symptoms and nutrient bioavailability.[8]

The role of probiotics and prebiotics in the prevention and treatment of diarrhoea in critically unwell adults is an emerging area of research.[16] Current evidence has shown these compounds may reduce diarrhoea occurrence in ICU patients but have limited efficacy in treatment.[16]

Conclusion

In summary, diarrhoea is a common issue for ICUs which negatively impacts patients and healthcare providers alike. Establishing the cause of diarrhoea is often challenging due to the multitude of factors that can contribute to onset. Frequently in clinical practice, patients experience multiple risk factors simultaneously. For example, a patient diagnosed with sepsis may also receive antibiotics, a prophylactic bowel regimen and high-osmolarity EN. If diarrhoea occurs, it can be challenging to establish if one of these aspects is causing diarrhoea in silo, or if it is the accumulative burden of all.

The MDT are likely to simultaneously implement management strategies to reduce symptoms. For example, on the same day, prescribers may discontinue medication and dietitians may change the enteral feed. If an improvement in symptoms is then observed, it is challenging to identify which of these management strategies was most effective, or if it was the synergistic effect of all.

MDT collaboration and communication is fundamental to achieve symptom resolution with professionals from medicine, nursing, IPAC, laboratory, pharmacy, dietetics and gastroenterology likely to be involved. Understanding the underlying aetiology enables selection of the most appropriate management strategy.

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