Chapter 41
Approach to Diarrhea in the ICU

41.1 Introduction

Diarrhea in critically ill patients can significantly affect their recovery, contributing to dehydration, electrolyte imbalances, skin breakdown, and even sepsis. Studies indicate that diarrhea affects 15–38% of ICU patients, highlighting the importance of effective management. The challenge lies in distinguishing true diarrhea from other changes in bowel habits, such as those caused by altered gut motility or enteral feeding. Accurate diagnosis and timely intervention are essential to prevent further complications and improve outcomes. This write-up provides a stepwise explanation of the management process, focusing on clinical decision points, diagnostic tools, and therapeutic interventions [1, 2] [Ref: Algorithm 41.1].

41.2 Criteria for Diarrhea

The initial step in managing diarrhea involves confirming its presence based on established criteria:

- Stool frequency: More than three stools per day.
- Stool weight: Greater than 200 grams per day.
- Consistency: Classified according to the Bristol Stool Chart (Type 5–7 indicates diarrhea).

Additionally, the World Health Organization (WHO) defines diarrhea as the passage of three or more liquid stools per day. Incorporating tools like the Bristol Stool Chart and Bliss Stool Classification System provides a robust framework for assessing stool consistency, ensuring accurate diagnosis and guiding treatment.

S. B. Mishra et al., *Mastering ICU Care*,
https://doi.org/10.1007/978-981-95-0179-3_41

41.3 Etiology

- Infective: Bacteria—*Vibrio cholerae*, *Salmonella*, *Shigella*, *Campylobacter*, *Escherichia coli*, *Clostridioides difficile.*
  - Virus—Rotavirus, Adenovirus, Norovirus.
  - Parasite—*Giardia*, *Amoeba (Entamoeba histolytica)*, *Strongyloides*, *Microsporidium*, *Cryptosporidium*, *Cyclospora.*
- Inflammatory: Inflammatory bowel disease, Ischemic colitis, Diverticulitis, Appendicitis.
- Food poisoning/Toxins/Poisoning (Organophosphorus).
- Immunosuppressants: Transplant patients, HIV patients.
- Irritable bowel syndrome.
- Endocrine: Adrenal dysfunction, bile acid malabsorption, pancreatic exocrine insufficiency, thyroid disorder.
- Drugs: Histamine receptor antagonists, Proton pump inhibitors, Potassium chloride, Antibiotics, NSAIDs, Cardiac (Quinidine, Digitalis, Theophylline), Prokinetics (Metoclopramide, 5HT4 agonists, Erythromycin), Anti-cancer drugs, Laxatives, Cholinergics.
- Enteral feeds, Hyperosmolar feeds.

41.4 Investigations

- Identify the cause of diarrhea. Send complete blood culture (hemoglobin, hematocrit, total leukocyte count), serum electrolytes, renal function tests, blood glucose levels.
- Stool tests: Stool routine microscopy for ova and parasites (if persists >7 days), hanging drop, culture. Look for fecal WBCs (mucosal invasion in Shigella, Campylobacter, Enterohemorrhagic and Enteroinvasive *E. coli*). Send for C. difficile toxins, Glutamate dehydrogenase. PCR for viral and bacterial toxins).
- Imaging: Abdominal X-ray may show signs of ischemia, partial obstruction, perforation, or a toxic megacolon associated with colitis. CECT abdomen may also be done if X-ray does not help or to assess the extent of the disease.
- Flexible or rigid proctosigmoidoscopy is useful in diagnosing antibiotic-associated colitis, distal ischemic colitis, GVHD, and vasculitis, to name a few.
- Other/Specific—*Giardia*, Rotavirus antigen, ELISA and PCR for viruses, Dark field/phase contrast microscopy for Campylobacter. Stool osmolal gap to rule out osmotic diarrhea (Stool osmolality—2*(Na + K)).

41.5 Evaluate Fluid and Electrolyte Status

Diarrhea in critically ill patients can cause rapid and significant fluid and electrolyte losses, leading to risks such as hemodynamic instability, cardiac arrhythmias, or acute renal failure. Early and accurate assessment of fluid and electrolyte status is vital to prevent severe complications and stabilize the patient.

41.5.1 Stable Fluid and Electrolyte Status

- Conservative Management: If the patient's fluid balance and electrolytes are within normal ranges, conservative management is recommended.
- Monitoring: Continuous monitoring of vital signs (blood pressure, heart rate), urine output, and serum electrolyte levels (sodium, potassium, magnesium) is crucial to detect early changes.
- Adjustments in Medication: Discontinue any nonessential medications, especially laxatives or diuretics, that could worsen fluid loss or electrolyte imbalances.

41.5.2 Deranged Fluid and Electrolyte Status

- Recognition and Signs of Hypovolemia: Tachycardia, hypotension, decreased urine output (<0.5 mL/kg/hour), and dry mucous membranes should prompt immediate intervention.
- Isotonic Fluid Administration: Start with isotonic fluids like normal saline or Ringer's lactate to rapidly restore intravascular volume. Adjust the volume based on severity, aiming for hemodynamic stability [3].

41.5.3 Electrolyte Replacement

- Potassium: Aim to keep serum potassium levels above 4.0 mEq/L to prevent cardiac arrhythmias. Intravenous potassium chloride can be administered, typically starting with 20–40 mEq over several hours, adjusting based on severity and monitoring serum levels.
- Magnesium: Maintain serum magnesium above 2.0 mg/dL to support cardiac and neuromuscular function. Magnesium sulfate can be given intravenously, typically 1–2 grams over 1–2 hours, depending on the deficit.
- Sodium and Hyponatremia: In cases of hyponatremia, careful correction is necessary to avoid rapid shifts that can lead to osmotic demyelination. Hypertonic saline (3%) may be used in severe cases, but isotonic saline is typically preferred for gradual correction.

41.5.4 Addressing Metabolic Acidosis

- Severe Acidosis: If metabolic acidosis is significant (e.g., bicarbonate <15 mEq/L), administer sodium bicarbonate cautiously. The typical dose is calculated based on the patient's base deficit, but a standard approach starts with 1–2 amps (50–100 mEq) diluted in intravenous fluids.
- Frequent Monitoring: Monitor arterial blood gases (ABGs) and serum bicarbonate levels to assess the effectiveness of treatment and adjust dosages accordingly.

41.5.5 Re-evaluation and Adjustments

- Continuous Assessment: Reevaluate fluid and electrolyte status every 4–6 hours in the acute phase to ensure the patient remains stable and to adjust treatment plans.
- Urine Output as a Marker: Aim for a urine output of 0.5–1 mL/kg/hour, as it serves as an important marker of adequate fluid resuscitation and renal function [4].

41.6 Assess for Infection

Infectious diarrhea is a critical concern in ICU patients, particularly in those with recent antibiotic use, immunosuppression, or enteral feeding. Testing for *Clostridioides difficile* (*C. difficile*) and other pathogens based on clinical suspicion is essential.

- Yes (Infected): If an infection is suspected or confirmed, targeted antibiotic therapy should be initiated:

  C. difficile infection:

  - Oral Fidaxomicin: 200 mg twice daily.
  - Oral Vancomycin: 125 mg four times daily, or 500 mg four times daily in severe cases. For ileus, rectal vancomycin (250 mg every 6 hours) may be used.
  - Oral Metronidazole: 500 mg every 8 hours.
  - Monitor for complications like abdominal distension and toxic megacolon. Discontinue broad-spectrum antibiotics when possible and consider fecal microbiota transplantation (FMT) for recurrent CDI.

Other infections:

- *Salmonella*: Ciprofloxacin 400 mg IV twice daily for 14 days or Ceftriaxone 2 g IV twice daily for 14 days. Transition to oral therapy when tolerated. Alternative options include Azithromycin 500 mg twice daily or Co-trimoxazole.
- Giardiasis/Amebiasis: Treated with Metronidazole.
- Strongyloidiasis: Managed with Ivermectin and Albendazole.

- No (Noninfectious Causes): If infection is ruled out, the focus shifts to other factors like enteral feeding formulas and medications [5].

41.7 Review Risk Factors and Noninfectious Causes

Diarrhea in ICU patients is often multifactorial, meaning that multiple contributing factors may be involved. Identifying and managing these factors is crucial for effective treatment. Noninfectious causes are common in this setting and may stem from medications, nutrition, and underlying systemic conditions like hypoalbuminemia. A comprehensive approach to managing these factors can help prevent the worsening of symptoms and promote recovery.

Adjustments to Enteral Feeding: Enteral feeding is a vital part of nutrition management in ICU patients, but it can contribute to diarrhea, particularly if high-osmolality formulas are used. High-osmolality feeds draw water into the intestine, which can increase stool frequency and volume. To mitigate this, switching to low-osmolality formulas can reduce the osmotic load on the gut, decreasing the likelihood of diarrhea. Additionally, fiber-enriched formulas can help improve stool consistency by absorbing excess water and promoting a more formed stool. Fiber can also provide a substrate for beneficial gut bacteria, potentially improving gut health. In cases where digestion is impaired, predigested or peptide-based formulas may be used, as these contain partially hydrolyzed proteins and fats, making them easier to absorb and reducing the gastrointestinal burden.

Medication Review: A detailed review of the patient's medication regimen is essential, as many commonly used drugs in the ICU can contribute to diarrhea. Antibiotics, especially broad-spectrum types, can disrupt the normal gut flora, leading to conditions like *Clostridioides difficile* infections or generalized antibiotic-associated diarrhea. Proton pump inhibitors (PPIs), used to reduce gastric acidity, can alter gut pH, promoting an environment that favors pathogenic bacteria. Laxatives, whether prescribed or given inadvertently through enteral formulas, can exacerbate diarrhea. Adjusting or discontinuing such medications when possible, while balancing the need for their therapeutic effects, can significantly reduce diarrhea risk. Deprescribing or substituting medications with less gastrointestinal side effects may be considered as part of a tailored approach to each patient.

Address Systemic Factors: Underlying systemic conditions can significantly impact gastrointestinal function. Hypoalbuminemia, a common condition in critically ill patients, can lead to gut edema and impaired barrier function, which may contribute to diarrhea. This condition reduces the oncotic pressure in the blood vessels, leading to fluid leakage into the intestinal lumen and resulting in loose stools. Correcting hypoalbuminemia through appropriate albumin supplementation or optimizing overall protein intake can improve bowel function. Other systemic factors, such as diabetes or thyroid disorders, should also be addressed as part of comprehensive care to ensure that they do not complicate the clinical picture further [6].

41.8 Prevent Complications

Diarrhea in critically ill patients can lead to a range of complications, requiring a proactive and comprehensive approach to minimize adverse outcomes:

- Skin Protection: Frequent, watery stools can lead to skin breakdown, which increases the risk of pressure ulcers and infection. Using barrier creams or zinc oxide ointments can protect the skin from moisture damage. Additionally, implementing a repositioning schedule helps reduce the risk of pressure sores, particularly in patients who are immobile. Maintaining meticulous skin care is vital to prevent secondary infections and promote comfort.
- Infection Control: In cases of infectious diarrhea, especially with pathogens like C. difficile, stringent contact precautions are essential to prevent the spread of infection to other patients and staff. Isolation protocols should be followed, and proper hand hygiene practices enforced. Healthcare workers should use personal protective equipment (PPE) appropriately to minimize cross-contamination. Implementing these measures is crucial for containing outbreaks within the ICU.
- Nutritional Optimization: Continuous diarrhea can hinder the absorption of nutrients, leading to malnutrition and weakening the patient's overall condition. Adjusting enteral feeding rates to match the patient's tolerance, using predigested formulas, or selecting formulas with medium-chain triglycerides can help improve nutrient absorption. It is important to ensure that the caloric and protein needs are met, either through enteral or parenteral nutrition, to support tissue repair and immune function. Regular assessments of nutritional status help to adapt feeding strategies according to the patient's evolving needs.

41.9 Symptom Relief

Managing symptoms of diarrhea can improve comfort and quality of life for patients, particularly when the underlying cause is noninfectious:

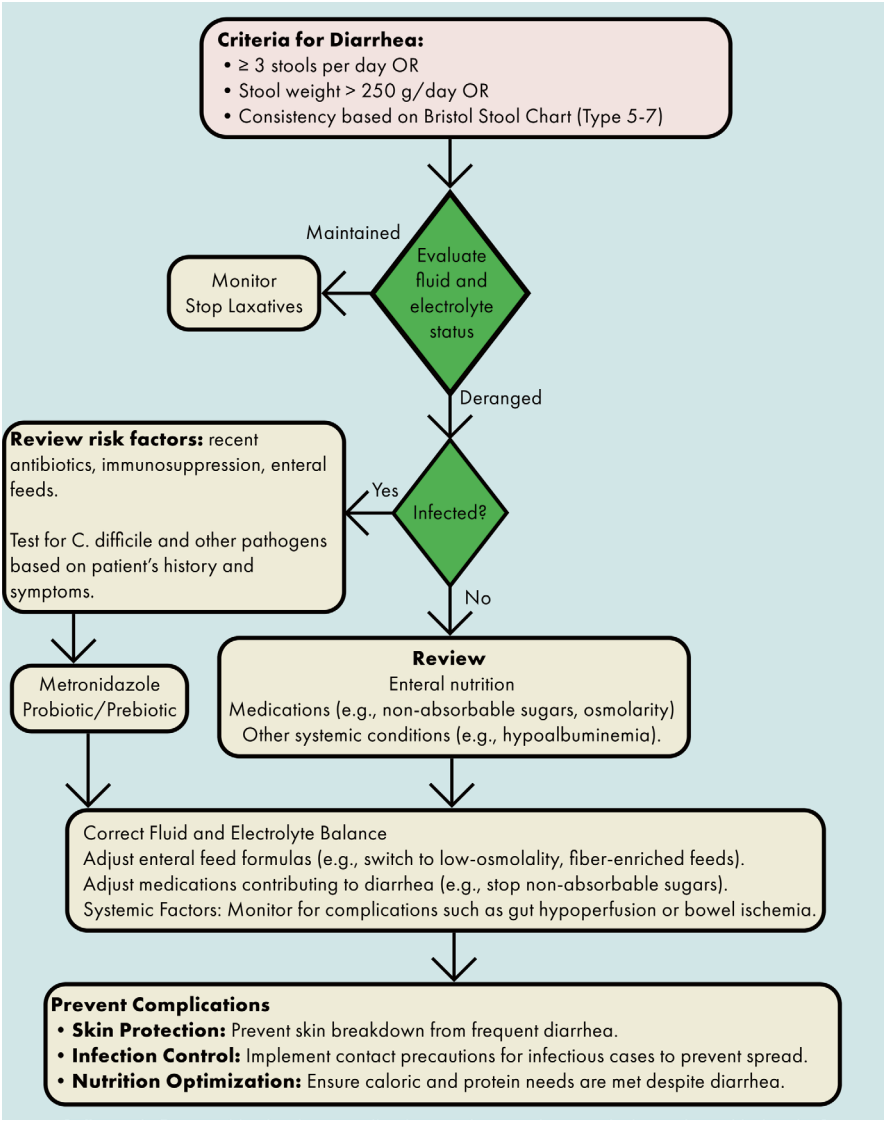
- Loperamide: An antidiarrheal that reduces bowel motility, loperamide (2–4 mg up to four times daily) can be effective in managing diarrhea caused by chemotherapy or other noninfective conditions. It should be used cautiously in infectious cases, as reducing motility can worsen infections.
- Racecadotril: As an antisecretory agent, racecadotril (100 mg three times daily) works by reducing intestinal water and electrolyte secretion, making it effective in reducing the volume of diarrhea.
- Somatostatin Analogues (Octreotide): Octreotide (50–250 mcg subcutaneously three times daily) is particularly useful in conditions like graft-versus-host disease (GVHD) or immunodeficiency, where it helps reduce gastrointestinal secretions and motility.
- Probiotics/Prebiotics: These can aid in restoring a healthy gut microbiome, potentially reducing diarrhea symptoms. However, they should be used with caution in immunocompromised patients due to the risk of systemic infection.
- Fiber-Enriched Formulas: These are especially beneficial in reducing stool frequency and improving the consistency of stools. They provide a substrate for beneficial bacteria and help bulk up stool, making them a valuable part of enteral feeding regimens for patients with diarrhea.

These measures ensure a comprehensive approach to managing diarrhea, addressing not only the symptoms but also the underlying causes and preventing complications in critically ill patients.

41.10 Conclusion

The management of diarrhea in critically ill patients requires a structured, evidence-based approach, focusing on the evaluation of fluid and electrolyte balance, assessment of infectious and noninfectious causes, and correction of contributing factors. Evidence-based protocols have been shown to reduce the incidence of diarrhea and improve patient outcomes, with a reported 13% reduction in diarrhea rates after protocol implementation. Preventing complications such as skin breakdown, malnutrition, and infection spread is essential for comprehensive care. Early recognition and intervention are crucial in preventing severe outcomes, ensuring better recovery and shorter ICU stays for patients.

Algorithm 41.1: Approach to diarrhoea in the ICU



Bibliography

1. Dionne JC, Sullivan K, Mbuagbaw L, Takaoka A, Duan EH, Alhazzani W, et al. Diarrhoea: interventions, consequences and epidemiology in the intensive care unit (DICE-ICU): a protocol for a prospective multicentre cohort study. BMJ Open. 2019;9(6):e028237.
2. Adelman MW, Woodworth MH, Shaffer VO, Martin GS, Kraft CS. Critical Care Management of the Patient with Clostridioides difficile. Crit Care Med. 2021;49(1):127–39.
3. Tirlapur N, Puthucheary ZA, Cooper JA, Sanders J, Coen PG, Moonesinghe SR, et al. Diarrhoea in the critically ill is common, associated with poor outcome, and rarely due to Clostridium difficile. Sci Rep. 2016;6:24691.
4. Johnson S, Lavergne V, Skinner AM, Gonzales-Luna AJ, Garey KW, Kelly CP, et al. Clinical practice guideline by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA): 2021 focused update guidelines on management of clostridioides difficile infection in adults. Clin Infect Dis. 2021;73(5):e1029–e44.
5. Ferrie S, East V. Managing diarrhoea in intensive care. Aust Crit Care. 2007;20(1):7–13.
6. Reintam Blaser A, Deane AM, Fruhwald S. Diarrhoea in the critically ill. Curr Opin Crit Care. 2015;21(2):142–53.