Nursing Section

Prevalence and Risk Factors of Diarrhoea among Critically Ill Patients in Intensive Care Units: A Cross-sectional Study

KARISHMA KHAUND[1], PINAKI BAYAN[2], NINGCINGYILE RAMLIA[3], KHAMTI MARY LYNGDOH LYNGKHOI[4], SANGITA PAUL[5], MRIDUSMITA PATHAK[6], SIDDHARTHA GOSWAMI[7], DEEPOM SHARMA[8]

(cc) BY-NC-ND

ABSTRACT

Introduction: Diarrhoea is common in critically ill patients that may be caused due to many factors such as *Clostridium difficile*, drugs (e.g., laxatives, antibiotics) and enteral feeds. The incidence of diarrhoea in the Intensive Care Units (ICU) has ranged in the literature from 2-95%. This wide variation may be due to lack of consistent definitions applied across studies, and ineffective metrics in monitoring patient's bowel habits in the ICU. Diarrhoea from any cause can place patients at risk for complications such as skin breakdown, dehydration, electrolyte disturbance, renal dysfunction, hypovolaemia, malnutrition, and contamination of wounds; therefore, diarrhoea should be recognised promptly.

Aim: To identify the prevalence of diarrhoea, its risk factors and its association with selected variables among patients admitted in ICU for >24 hours.

Materials and Methods: The present cross-sectional descriptive study was conducted with the purpose to acquire detailed information on diarrhoea and its associated risk factors in Apollo hospitals in northeastern region, India. The study was conducted for a period of six months (October 2023-March 2024) among ICU patients who stayed for >24 hours in adult ICU of a tertiary care hospital in northeastern region, India. The diarrhoea patients were included in the study as defined by World Gastroenterology Organisation. Patients admitted under Gastroenterology Department, diarrhoea on admission and advised to use laxatives (e.g., hepatic encephalopathy)

were excluded from the study. Both descriptive and inferential statistics were used to analyse the study findings.

Results: A total of 1219 patients were included in the study, out of which 50 (4.2%) patients were found to have diarrhoea. The age of the patients was found to be >65 years for 32% patients with diarrhoea. Majority (82%) of the patients with diarrhoea passed stool 3-6 times/day, 4% had positive results for *C.difficile*, 52% of patients stayed in the ICU for >14 days. Antibiotic or antifungal therapy was administered to all patients (100%) and all of them (100%) received empirical antibiotic therapy. A 90% of patients were on ventilator for 0-15 days. This study identified the non-modifiable risk factors including age >65 years {Risk Ratio (RR) 7.5, 95% CI 0.03-0.004}, ventilation (RR 7, 95% CI 0.14 - 0.02) and modifiable risk factor i.e., sepsis (RR 11.6, 95% CI 0.35 - 0.03). In contrast, antibiotic administration was found to have low risk (RR 0.04 95% CI 0.04 - 0) for causing diarrhoea. The study also identified that in critically ill patients, diarrhoea was significantly associated with ventilator use (p<0.01), sepsis (p<0.05), and an ICU stay longer than 14 days (p<0.05).

Conclusion: According to the present study findings, diarrhoea is a frequent concern in the ICU and is associated with prolonged mechanical ventilation, increased length of ICU stays, skin breakdown and renal dysfunction. The results showed that 100% samples who had diarrhoea were on antibiotics. Hence further studies will be required to strengthen the use of antibiotics.

INTRODUCTION

Diarrhoea is the augmentation of water content in stools because of an imbalance in the normal functioning of physiologic processes of the small and large intestine responsible for the absorption of various ions, other substrates, and consequently water [1]. Diarrhoea is derived from the Greek word "to flow through," it is the passage of ≥3 loose or liquid stools per day. Diarrhoea can last for several days, and can leave the body without the water and salts that are necessary for survival [2]. Diarrhoea also impacts on patient dignity, increased nursing workload and healthcare costs, and exacerbates morbidity through dermal injury [2]. Diarrhoea correlates with rapid gut transit time and is associated with impaired absorption in both the small bowel and colon, alterations in bacterial turnover, and acidification of the distal colon, which can lead to patient discomfort due to pain, urgency, and faecal incontinence [3]. Diarrhoea is common in critically ill patients that may be caused due to many factors such as *Clostridium difficile*, drugs (e.g., laxatives, antibiotics) and enteral feeds [3]. The European Society of Intensive Care Medicine (ESICM) defines diarrhoea in the ICU as having at least

three loose or liquid stools per day, with a stool volume greater than 250 milliliters per day [4].

The incidence of diarrhoea in the ICU has ranged in the literature from 2-95% [5,6]. Diarrhoea is also independently associated with ventilator use, increased length of stay in ICU (mean (standard error) 14.8 (0.26) vs 3.2 (0.09) days, p<0.001) and mortality (22.0% (265/1207) vs 8.7% (705/8124), p<0.001). Almost all antibiotics, except tobramycin and minocycline (ROR 0.98; 95%CI: 0.64-1.51 and 0.42; 95% CI: 0.16-1.11, respectively), showed a significant correlation with antibiotic associated diarrhoea [7]. This wide variation may be due to lack of consistent definitions applied across studies, and ineffective metrics in monitoring patient's bowel habits in the ICU. One systematic review examining diarrhoea showed an incidence of 3.3-73% across eight studies. A study found differences in incidence across definitions applied [8]. With the World Health Organisation (WHO) definition the incidence was 73.8% (95% CI, 71.1-76.6), 53.5% (95% CI 50.4-56.7) with Bristol and 37.7% (95% CI 34.9-40.4) using bliss tool [9].

Diarrhoea from any cause can place patients at risk for complications such as skin breakdown, dehydration, electrolyte disturbance,

renal dysfunction, hypovolaemia, malnutrition, and contamination of wounds; therefore, diarrhoea should be recognised promptly. Some studies also found that diarrhoea was also associated with increased patient morbidity, prolonged mechanical ventilation, length of stay, and high mortality. Despite the risks associated with diarrhoea, there is limited research in India on the epidemiology of diarrhoea in critical illness. To seek a better understanding on diarrhoea; the present study aimed to identify its prevalence which remained as primary objectives, risk factors and its association with selected variables among patients admitted in ICU for >24 hours which remained as secondary objectives. Identifying these factors will help in prevention and treatment of diarrhoea and this will aid in mitigating the complications associated with diarrhoea.

MATERIALS AND METHODS

The present cross-sectional descriptive study was conducted in Apollo hospitals in northeastern region, India in selected critical care units among patients admitted in ICU between October 2023 to March 2024, with the purpose to acquire detailed information on diarrhoea and its associated risk factors. This study was conducted in accordance with the Declaration of Helsinki.

Sample size calculation: In this study, sample size was calculated using online sample size calculator [10].

$$n=\frac{z^2 \times \hat{p}(1-\hat{p})}{\varepsilon^2}$$

$$n=\frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}=384.16$$

Where z is the Z score, ε is the margin of error, N is the population size, $\hat{p}$ is the population proportion:

z=1.96, $\hat{p}$=0.5, ε=0.05

Final sample size was estimated to be 384.

Inclusion and Exclusion criteria: Consequently, 1219 ICU patients who stayed for more than 24 hours in the ICU were included in the study for the selected period. The prevalence of diarrhoea was assessed with the definition given by World Gastroenterology Organisation and Bristol Stool Chart (Types 6-7) [4]. Patients admitted under Gastroenterology Department, diarrhoea on admission and advised to use laxatives (e.g., Hepatic Encephalopathy) were excluded from the study.

Study Procedure

Critical care unit was selected for the study. Purposive sampling method was adopted. Data collection tool was developed based on inclusion and exclusion criteria. A data collection tool consisting of 24 questions were developed to identify the risk factors for diarrhoea and demographic variable (tool is attached in the appendix). The research team trained ICU bedside nurses to track the number and character of each stool daily and document in the ICU flow chart. The patients' first episode of diarrhoea after 24 hours of admission to ICU was considered as the index case.

STATISTICAL ANALYSIS

To summarise the demographic characteristics and prevalence of the study population, descriptive statistics such as frequency, mean and percentage were used. Inferential statistics, including relative risk ratio and Chi-square analysis, were used to examine the research hypothesis which was to identify the association between diarrhoea and non-modifiable factors like gender, age and modifiable factors such as sepsis and antibiotic administration at p-value of <0.05 and 95% confidence interval. Inferential statistic was applied also to identify the association between diarrhoea and non-modifiable risk factor (ventilator) at p-value of <0.01 and at 99% confidence interval.

RESULTS

The study revealed that out of 1219 patients admitted in ICU, 50 patients were identified to have diarrhoea as defined by World Gastroenterology Organisation, and the overall prevalence of patients with diarrhoea was found to be 4.2% [Table/Fig-1].
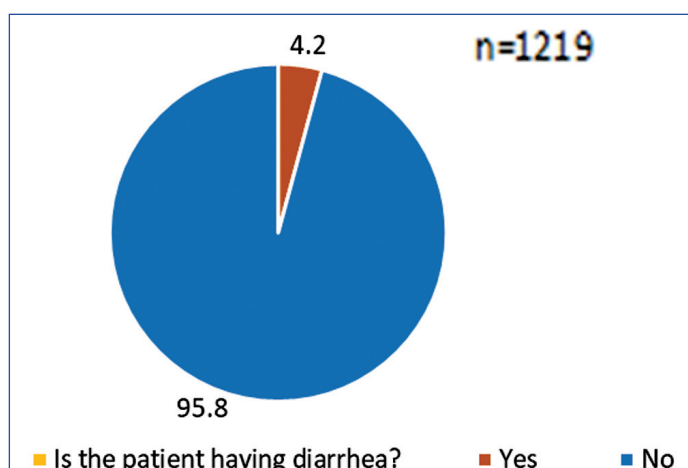

[Table/Fig-1]: Prevalence of Diarrhoea.

The study revealed that a total of 64% (majority) of patients with diarrhoea were male and 36% were female, 21 (42%) patients with diarrhoea were >65 years, 23 (46%) were at the age between 46-65 years, 5 (10%) were between 31-45 years and 1 (2%) were between 18-30 years. An 41 (82%) (majority) patients with diarrhoea passed stool 3-6 times/day, 8 (16%) patients passed 7-10 times/day and 1 (2%) passed 11-14 times/day [Table/Fig-2].
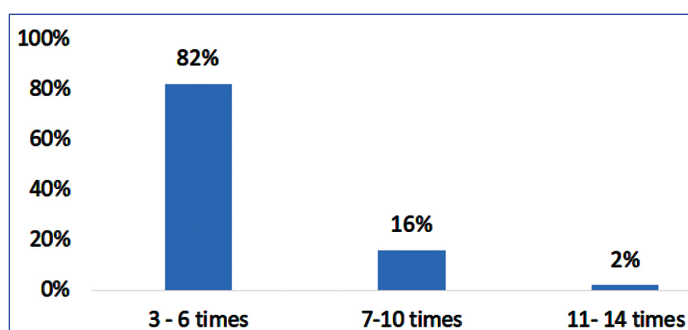
[Table/Fig-2]: Frequent and percentage distribution of Diarrhoea episodes per day.

Stool culture was sent for 10% of patients with diarrhoea wherein all the stool cultures performed were negative for pathogenic microorganisms, 22% of patients stool was sent for checking the presence of *C. difficile* where a significant portion (4%) had positive results for *C. difficile* [Table/Fig-3].
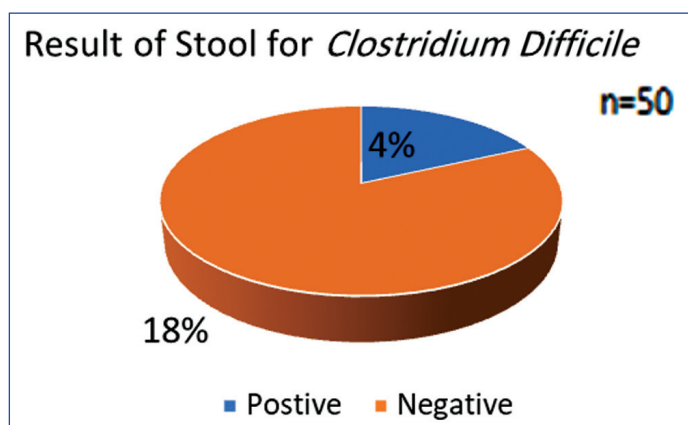
[Table/Fig-3]: Presence of *C. difficile* in diarrhoea patients.

Length of stay in the ICU exceeded 14 days for 52% of patients, while 20% stayed for 11-14 days. Shorter stays of 6-10 days were observed in 24% and 4% remained for 3-5 days [Table/Fig-4]. A 26%

Total ICU days	Diarrhoeal patients (n=50)		Non-diarrhoeal patients (n=1169)	
	Frequency	Percentage	Frequency	Percentage
3-5 days	2	4%	695	57%
6-10 days	12	24%	154	13%
11-14 days	10	20%	183	19%
>14 days	26	52%	137	11%

[Table/Fig-4]: Frequency and percentage distribution for total ICU days of both diarrhoeal and non-diarrhoeal patients.

of diarrhoeal patients were admitted in the ICU with the diagnosis of Sepsis however only 5% of non-diarrhoeal patients were diagnosed as Sepsis.

Antibiotic or antifungal therapy was administered to all patients (100%) and all of them (100%) received empirical antibiotic therapy; majority (84%) of the diarrhoeal patients was on polytherapy however only 16% patients were on monotherapy. The majority (74%) received 1-4 antimicrobials, while 24% required 5-8 and 2% needed >9 antimicrobials. Antibiotic or antifungal treatment lasted for 8-14 days for 58%, 0-7 days for 40%, and >15 days for 2%; 86% (majority) of the patients received antibiotic on the day of admission while 8% of the patient's received antimicrobial from 2nd-5th day and 6% received antimicrobial from 6th day onwards; The majority of patients with diarrhoea (78%) received beta-lactam antibiotics, followed by carbapenems (64%). Other antibiotics used included glycopeptides (26%), tetracyclines (24%) antifungals (22%), oxazolidinones (10%), lincosamide (10%), nitrimidazoles (6%). quinolones (2%), aminoglycosides (2%) and polypeptides (2%) [Table/Fig-5].
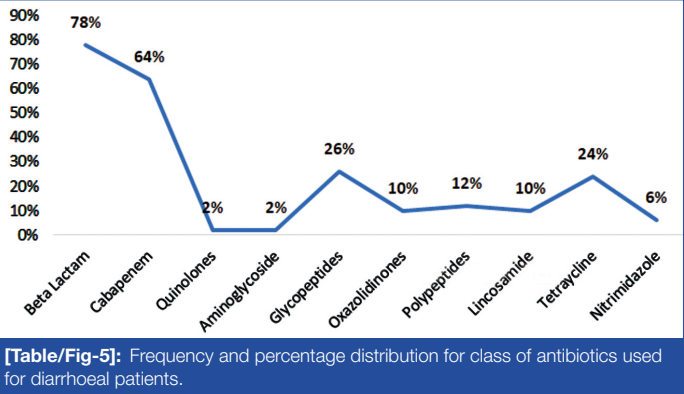
[Table/Fig-5]: Frequency and percentage distribution for class of antibiotics used for diarrhoeal patients.
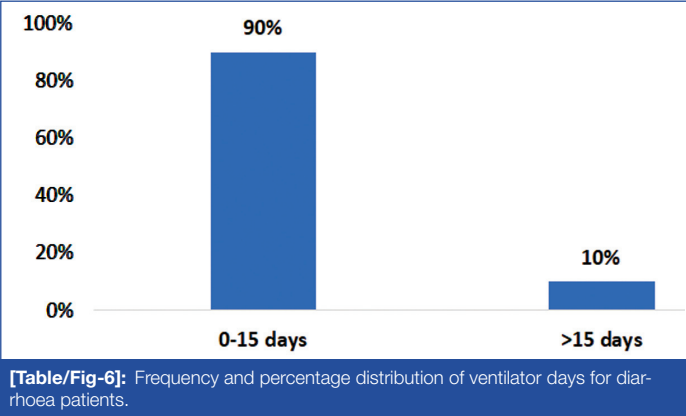
While doing the analysis of enteral feeding it was found that 76% patients were on enteral feed while 24% were on oral feed. Out of 76% of patients receiving enteral feeding, 95% were on closed-system feeding, while 5% were on open-system feeding; they also tried to find out the days of enteral feeding the patient received, it was noted that 71% were on enteral feeding for 0-15 days, 26% for 16-35 days and 3% for >35 days. Concerning medication intake by diarrhoeal patients; researcher found that 66% of patients received 11-20 medications, while 18% received 0-10, 16% required 21-30 medications.

Ventilation was necessary for 42% of patients while 58% did not require ventilation, among the ventilated patients, 90% patients were on ventilator for 0-15 days and 10% were on ventilation for >15 days [Table/Fig-6].

Inferential statistics, including relative risk ratio and Chi-square analysis, were used to examine the research hypothesis which was to identify the association between diarrhoea and non-modifiable factors like age and ventilator and modifiable factors such as sepsis and antibiotic administration. This study identified the following independent non modifiable risk factors including age >65 years (RR 7.5, 95% CI 0.03-0.004), ventilation (RR 7, 95% CI 0.14-0.02), sepsis (RR 11.6, 95% CI 0.35-0.03). In contrast,

antibiotic administration had low risk (RR 0.04 95% CI 0.04 - 0) [Table/Fig-7] [11].

[Table/Fig-6]: Frequency and percentage distribution of ventilator days for diarrhoea patients.

Variables	RR (95% CI) (Z Value±1.96)	Risk interpretation
Age (>65 years)	7.5 (0.03-0.004)	If RR value is less than 1 risk of outcome is decreased by the exposure. i.e., if the variables RR value is >1, it has the risk for causing diarrhoea. (e.g., RR value of Sepsis is 11.6 i.e., patient with Sepsis had 11.6 times risk to cause diarrhoea) [11]
Antibiotics	0.04 (0.04-0)	
Ventilator usage	7 (0.14-0.02)	
Sepsis	11.6 (0.35-0.03)	

[Table/Fig-7]: Risk interpretation for modifiable and non-modifiable risk factors for Diarrhoea [11].

In critically ill patients, diarrhoea was not significantly associated with ventilator use, sepsis and an ICU stay longer than 14 days as determined by Chi-square analysis [Table/Fig-8].

Variables	Chi-square (95% CI)	p-value at df=1
Age (>65 years)	0.8	0.90-0.10
Gender (Female)	0.02	0.90-0.10
Gender (Male)	0.02	0.90-0.10
Antibiotics	0.33	0.90-0.10
Ventilator usage	50.7	>0.005
Sepsis	35.66	>0.005
Length of ICU stay	66.6	>0.005

[Table/Fig-8]: Associated modifiable and non-modifiable risk factors for Diarrhoea. (Chi-square two by two table is attached in appendix).

DISCUSSION

The study revealed that out of 1219 patients admitted in ICU for the period of 6 months, 50 patients developed diarrhoea, the overall prevalence of patients with diarrhoea was found to be 4.1%, a total of 64% (majority) of patients with diarrhoea were male and 36% were female, 32% patients with diarrhoea age was >65 years, 26% were at the age between 46-65 years, 4% were between 31-45 years and 2% were between 18-30 years, similarly in the study by Nemeth V and Pfleghaar N (2022) revealed that diarrhoea was found in 5.3% (199/3737) of patients admitted to the Whittington Hospital ICU, median age (Inter-Quartile Range (IQR) 64 (48-77) and 1912 (51.1%) patients were male [1].

Another study which was done by Thibault R et al., (2013) found 0.7% of *C. difficile* infection [6]. These results indicate that *C. difficile* infection is a rare cause of diarrhoea in the ICU in current days. However, it is important to evaluate the cause for diarrhoea because of its potentially severe consequences and transmission.

This study identified the following independent non modifiable risk factors including age >65 years (RR 7.5, 95% CI 0.03-0.004), ventilation (RR 7, 95% CI 0.14-0.02), sepsis (RR 11.6, 95% CI 0.35-0.03). Similar findings were reported by another study where it was identified as severe sepsis (3.95%) is common in diarrhoeal adults. In contrast, antibiotic administration had low-risk (RR 0.04 95% CI 0.04-0). However, the current study findings are contradictory as

the study conducted by Thibault R et al., (2013) concluded that diarrhoea risk was increased by the presence of antibiotics (relative risk=4.8 (2.1 to 13.7)) or antifungal drugs (relative risk=5.0 (2.8 to 8.7) [6]. Chi-square analysis revealed significant associations between diarrhoea and ventilator use (p<0.01), sepsis (p<0.05), and ICU stay longer than 14 days (p<0.05) in critically ill patients. Similar findings were reported by another study where it was identified longer ICU hospitalisation time (10.24±3.03), age >60 years (70.69%), and mechanical ventilation (27.59%) with p-value <0.05 [7].

In critically ill patients, diarrhoea was significantly associated with ventilator use (p<0.01), sepsis (p<0.05), and an ICU stay longer than 14 days (p<0.05), as determined by Chi-square analysis. Similarly in the study by Huang H et al., (2023), longer ICU hospitalisation time (10.24±3.03), age >60 years (70.69%) and mechanical ventilation (27.59%) time were risk factors for diarrhoea [7].

Among patients with diarrhoea, sepsis was the most common reason for admission, accounting for 26% of cases. These findings are consistent with a study by Dionne JC et al., (2022), which reported similar proportions of patients with diarrhoea admitted for sepsis (11.7%) [8].

The ICU stay exceeded to 14 days for majority of patients (52%), with 20% requiring hospitalisation for 11-14 days. Shorter stays of 6-10 days were observed in 24% of patients, while only 4% required less than five days of intensive care. The study findings were similar to a study by Dionne JC et al., (2022) reported a median ICU stay of 15 days among patients with diarrhoea (interquartile range: 8-31) [8]. Another study reported that the Mean Difference (MD) in ICU length of stay between patients with and without diarrhoea was 8.08 days (95% CI: 5.85 to 10.32) [12].

While doing the analysis of enteral feeding it was found that 76% patients were on enteral feed while 24% were on oral feed. Out of 76% of patients receiving enteral feeding, 95% were on closed-system feeding, while 5% were on open-system feeding; the authors also tried to find out the days of enteral feeding the patient received, it was noted that 71% were on enteral feeding for 0-15 days, 26% for 16-35 days and 3% for >35 days. Concerning medication intake by diarrhoeal patients; researcher found that 66% of patients received 11-20 medications, while 18% received 0-10, 16% required 21-30 medications. Ventilation was necessary for 42% of patients while 58% did not require ventilation, among the ventilated patients, 90% patients were on ventilator for 0-15 days and 10 % were on ventilation for >15 days. Similar findings were reported by Dionne JC et al., who observed invasive mechanical ventilation in 55.9% (455/818) of patients with diarrhoea [8].

An 82% (majority) of patients with diarrhoea passed stool for 3-6 times/day,16% patients passed 7-10 times/day and 2% passed 11-14 times/day, 22% of patients stool were sent for checking the presence of *C. difficile*. In the current study, *C. difficile* was present for 4% of the samples. The study which was done by Mendelsohn A et al., (2024b) also summarised 1% of 323 patients acquired *C. difficile* who were hospitalised for less than one week which is similar to the current study [13]. The occurrence of diarrhoea with severe sepsis is also understandable in the current study as bacteria may travel to the systemic circulation from an infected intestine which can lead to sepsis. Diversely sepsis hampers gastrointestinal motility and result in paralytic ileus [13]. Similar findings were also reported from study done by Varkila MRJ et al., (2024) where sepsis was common (3.95%) among diarrhoeal patients [14].

Antibiotic or antifungal therapy was administered to all patients (100%) and all of them (100%) received empirical antibiotic therapy; majority (84%) of the diarrhoeal patients was on poly-therapy however only 16% patients were on monotherapy. The majority (74%) received 1-4 antimicrobials, while 24% required 5-8 and 2% needed >9 antimicrobials. Antibiotic or antifungal treatment

lasted for 8-14 days for 58%, 0-7 days for 40%, and >15 days for 2%; 86% (majority) of the patients received antibiotic on the day of admission while 8% of the patient's received antimicrobial from 2nd-5th day and 6% received antimicrobial from 6th day onwards. The majority of patients with diarrhoea (78%) received beta-lactam antibiotics, followed by carbapenems (64%). Other antibiotics used included glycopeptides (26%), tetracyclines (24%) antifungals (22%), oxazolidinones (10%), lincosamide (10%), nitrimidazoles (6%), quinolones (2%), aminoglycosides (2%) and polypeptides (2%). This findings were consistent with the findings from the study conducted by Huang H et al., (2023) which revealed that out of 209 patients enrolled, 125 (59.81%) were treated with beta-lactam plus enzyme inhibitors; 39 (18.66%) patients were treated with carbapenem antibiotics; 23 (11.00%) patients were treated with cephalosporin antibiotics; 12 (5.74%) patients were treated with quinolone antibiotics; 4 (1.91%) patients were treated with antifungals; 2 (0.96%) patients were treated with glycopeptides; and 4 (1.91%) patients were treated with oxazolidinone antibiotics; and 2 (0.96%) patients were treated with glycopeptides [7]. The current study highlights the importance of number of antibiotic usage and minimising the number of antibiotic days for patients in the ICU; however, the study could not identify the association of antibiotic days and severity of diarrhoea.

Limitation(s)

The current study may serve as a basic step for future research work in refining the policy for care of patient with diarrhoea, to identify risk reduction factors and develop preventive strategies to develop diarrhoea as the current study was limited only to medical-superspeciality ICU in one setting.

CONCLUSION(S)

Diarrhoea is a frequent concern in the ICU and is associated with prolonged mechanical ventilation, increased length of ICU stays, skin breakdown and renal dysfunction. However, its prevalence, etiology and prognosis in the critically ill have been poorly studied. In the current study it was evident that 100% samples who had diarrhoea were on antibiotics, further study will be required to strengthen the usage of antibiotics. Although antibiotic stewardship programs are implemented in various healthcare settings to improve patient outcomes, reduce cross infection and prevent secondary infections; the process is yet to be established in many settings. Similar study will be helpful to identify the gaps in antibiotics usage and develop a stringent practice in terms of usage of antibiotic and exploring the need of investigations related to culture and sensitivity. Future investigations are necessary to identify whether addressing modifiable factors may prevent diarrhoea and its complication also it can aid in mitigating the other associated concerns like moisture associated skin damage, electrolyte imbalance etc.,

REFERENCES

[1] Nemeth V, Pfleghaar N. Diarrhea [Internet]. PubMed. Treasure Island (FL): StatPearls Publishing; 2022. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448082/.

[2] World Health Organization. Diarrhoeal Disease [Internet]. Who.int. World Health Organization: WHO; 2024. Available from: https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease.

[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. Scientific Reports [Internet]. 2016;6(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4837391/pdf/srep24691.pdf.

[4] AlKhawaja S. Diarrhea in critically ill patient. EC Nutr. 2017;9(2):105-15.

[5] Whelan K, Judd PA, Taylor MA. Assessment of fecal output in patients receiving enteral tube feeding: Validation of a novel chart. European Journal of Clinical Nutrition [Internet]. 2004;58(7):1030-37. Available from: https://www.nature.com/articles/1601927

[6] Thibault R, Graf S, Clerc A, Delieuvin N, Heidegger C, Pichard C. Diarrhoea in the ICU: Respective contribution of feeding and antibiotics. Critical Care. 2013;17(4):R153.

[7] Huang H, Li L, Wu M, Liu Z, Zhao Y, Peng J, et al. Antibiotics and antibiotic associated diarrhea: A real-world disproportionality study of the FDA adverse event reporting system from 2004 to 2022. BMC Pharmacology and Toxicology. 2023;24(1):73.

[8] 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 [Internet]. 2019 Jun 1 [cited 2021 Sep 28];9(6):e028237. Available from: https://bmjopen.bmj.com/content/9/6/e028237.

[9] Zimmaro Bliss D, Dhamani KA, Savik K, Kirk K. Tool to classify stool consistency: Content validity and use by persons of diverse cultures. Nursing & Health Sciences. 2003;5(2):115-21.

[10] https://www.calculator.net/sample-size-calculator.html?type=2&cl2=95&ss2=385&pc2=60&ps2=&x=Calculate#findci.

[11] Sharma SK. Nursing research and statistics. 3rd ed. Rishikesh (IN): College of Nursing, Elsevier publication, All India Institute of Medical Sciences; 2018.

[12] Taito S, Kawai Y, Liu K, Ariie T, Tsujimoto Y, Banno M, Kataoka Y. Diarrhea and patient outcomes in the intensive care unit: Systematic review and meta-analysis. J Crit Care. 2019;53:142-48. Doi: 10.1016/j.jcrc.2019.06.014. Epub 2019 Jun 18. PMID: 31238230.

[13] Mendelsohn A, Sato T, Ankita Subedi, Wurcel AG. State-of-the-Art review: Evaluation and management of delusional infestation. Clinical Infectious Diseases [Internet]. 2024 Jul 23 [cited 2024 Oct 23];79(2):e1-e10. Available from: https://academic.oup.com/cid/article/79/2/e1/7718272.

[14] Varkila MRJ, Verboom DM, Derde LPG, van der Poll T, Bonten MJM, Cremer OL et al. Gut barrier dysfunction and the risk of ICU-acquired bacteremia- a case-control study. Ann Intensive Care. 2024;14:42. Available from: https://doi.org/10.1186/s13613-024-01280-8.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Nursing Superintendent, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
2. Chief Nursing Officer, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
3. Nurse Educator, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
4. Wound Care Nurse, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
5. Nurse Educator, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
6. Patient Educator, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
7. Critical Care Consultant, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.
8. Critical Care Consultant, Department of Nursing, Apollo Hospitals Guwahati, Assam, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Karishma Khaund,
Apollo Hospitals Guwahati, GS Road, Lotus Tower, Near City Center Mall,
Guwahati-781005, Assam, India.
E-mail: karishma_k@apollohospitals.com

AUTHOR DECLARATION:
• Financial or Other Competing Interests: None
• Was Ethics Committee Approval obtained for this study?   No
• Was informed consent obtained from the subjects involved in the study?   NA
• For any images presented appropriate consent has been obtained from the subjects.   NA

APPENDIX

1. **Data Collection Tool:**

Name of patient -

UHID-

Gender

- Male
- Female

Age (in years)

- 18-30
- 31-45
- 46-65
- >65

No of episodes of diarrhoea per day-

Stool culture sent

- Yes
- No

If culture is sent. Organism present or not

- Yes
- No

Stool sent for *clostridium difficile*

- Yes
- No

If sent, mention the result as positive or negative-

Total ICU days

- 3-5 days
- 6-10 days
- 11-14 days
- >14 days

Reason for Intensive Care Unit (ICU) admission

- Cardiovascular.
- Respiratory failure
- Sepsis
- Renal failure
- Operative intervention
- Neurological
- Haematological
- Gastro intestinal
- Other.

Any other reason for intensive care admission-

Is the patient on antibiotic/Antifungal?

- Yes
- No

Mention the antibiotic/antifungal days:

Anti-microbial started after how many days of admission-

Type of antibiotic therapy

- Empirical
- Definite

Was antibiotic started after culture report

- Yes
- No

Description of De-escalation of antibiotic as per culture report-

Patients acquired diarrhoea after medication administration

- Yes
- No

Antimicrobial which caused diarrhoea. Specify if applicable

Is the Patient on enteral feed?

- Yes
- No

Type of enteral feeding

- Open
- Closed
- None

Days of enteral feeding if applicable-

Did the patient acquire diarrhoea Post enteral or kitchen feed?

- Yes
- No

Specify the days if applicable-

Is the patient LOS increased due to diarrhoea?

- Yes
- No

No. of days lengthened due to diarrhoea. If applicable

Total no. of drugs administered to the patient -

Is the patient on laxatives

- Yes
- No

Specify laxatives if applicable-

Is the patient on ventilator?

- Yes
- No

Specify ventilator days if applicable-

Did the patient acquire diarrhoea post-ventilation?

- Yes
- No

Specify the days of ventilation if applicable-