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Antibiotic Overuse in Paediatric Gastroenteritis: A descriptive cross-sectional study from Children's Hospital

Mumtaz Ali Bharo[1], Ubedullah Bahalkani[2*], Pardeep Kumar[3], Asif Ali Khuhro[3], Iftikhar Haider Shah[3] and Muhammad Zaki[1]

[1]Department of Paediatrics, Ghulam Muhammad Mahar Medical College Hospital, Sukkur, Pakistan
[2]Department of Paediatrics, Khairpur Medical College, Khairpur Mirs, Pakistan
[3]Department of Paediatrics, Pir Abdul Qadir Shah Jeelani, Institute of Medical Sciences, Gambat, Pakistan

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Corresponding Author:
Ubedullah Bahalkani
Department of Paediatrics, Khairpur Medical College, Khairpur Mirs, Pakistan
ubedullahdr@gmail.com

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ABSTRACT

There is a major role of gastroenteritis in pediatric patients. Knowing about prescription trends is very useful in optimizing treatment and minimizing the use of unnecessary medication. **Objective:** To assess the frequency of antibiotic prescriptions in children with gastroenteritis and evaluate the appropriateness of these prescriptions based on clinical criteria and the impact this line of management has on the duration of their hospital stay. **Methods:** A total number of participants was n= 200 children, diagnosed as gastroenteritis. Demographic, clinical and antibiotic data were collected. SPSS version 21.0 was used in performing statistical analysis with $p < 0.001$ as the level of significance. **Results:** In 200 children with gastroenteritis (mean age 4.5 ± 2.3 years; weight 14.2 ± 4.1 kg), 50% had severe dehydration, 60% had fever, and 75% had vomiting. IV rehydration was required in 65%, with a mean hospital stay of 24.2 ± 5.5 hours. Inappropriate antibiotic use occurred in 75% of cases. Dehydration (OR = 3.50), fever (OR = 1.87), and inappropriate antibiotic use (OR = 2.75) significantly predicted IV rehydration (all $p < 0.001$). Dehydration and inappropriate antibiotic use also significantly prolonged hospital stay. **Conclusion:** Antibiotic prescription rates for pediatric gastroenteritis are extremely high and alarmingly, the majority of them are inappropriate.

INTRODUCTION

Diarrhea, vomiting, fever and dehydration due to gastroenteritis is one of the most common illnesses of children in the world [1, 2]. Prevalence of invasive disease is high and it plays a major role in morbidity and hospitalization in pediatric patients and constitutes a major cause of morbidity and hospitalization in developing countries of the low- and middle-income categories characterized by poor sanitation and poor access to health services. The causes of the disease include viruses (such as rotavirus, norovirus), bacteria (such as Escherichia coli, Salmonella, Shigella, Campylobacter), and parasites (such as Giardia, Cryptosporidium) [3]. Supportive management of gastroenteritis is directed towards purely supportive care, with the aid of lots of fluids and oral electrolyte replacement, tailored diet modifications and symptomatic treatments [4]. In children, most of the cases are caused by viral gastroenteritis; antibiotics are often prescribed even though indications are limited [5]. A much lesser proportion is due to bacterial gastroenteritis for which specific antibiotic treatment is necessary. Antimicrobial resistance (AMR), or the resistance bacteria build up due to indiscriminate antibiotic use, is associated with higher risk of treatment failure and complications in a patient [6]. According to The World Health Organization (WHO) and national guidelines, the use of antibiotics should be judicious, only done in cases of suspected bacterial

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infection, e.g. severe dysentery, high fever especially with systemic signs, and only when the bacteria are confirmed with culture results [7]. Yet, common clinical prescribing practices are not appropriate, which results in too much drug use, development of resistance, and adverse drug reaction [8]. In Pakistan, the current management and therapeutic guidelines for acute gastroenteritis (GE) appear to be ineffective, leading to suboptimal cure rates and a rising number of hospital admissions. Many patients experience recurrent GE episodes, indicating that the existing treatment protocols may not be adequately addressing the underlying causes or providing long-term relief. This highlights the need for further research to identify the key factors contributing to treatment failure, including potential gaps in adherence to guidelines, antimicrobial resistance, and socioeconomic constraints affecting access to care. Additionally, there is an urgent need to develop cost-effective treatment strategies that align with international guidelines while being specifically tailored to Pakistan's healthcare infrastructure, resource availability, and patient population.

To assess the frequency of antibiotic prescriptions in children with gastroenteritis and evaluate the appropriateness of these prescriptions based on clinical criteria and the impact this line of management has on the duration of their hospital stay.

METHODS

It was a descriptive cross-sectional. The study was conducted for six months from August 2024 to January 2025 at the department of Pediatrics, Khairpur Medical college Khairpur Mir's. The age range of children was 1-8 years, diagnosed as having gastroenteritis. The sample size for this cross-sectional study was calculated using Cochran's formula: $n = (Z_{1-\alpha/2})^2 \times p \times (1-p) / d^2$, where $Z = 1.96$ for 95% confidence, $p = 0.5$ (assumed prevalence of antibiotic overuse), and $d = 0.07$ (margin of error). The final sample size was rounded up to 200. Patients with the diagnosis of acute gastroenteritis (GE) defined by symptoms such as diarrhea, vomiting, dehydration, abdominal pain, or fever, presenting for medical care within 48 hours of symptom onset were included in this study. Male patients of all ages eligible at hospitals, clinics, or primary healthcare centers in Pakistan provided they given informed consent. Patients who have chronic or recurrent GE lasting greater than 2 weeks, pre-existing gastrointestinal disorders or severe comorbid medical conditions such as uncontrolled diabetes mellitus, renal failure or immunodeficiency were excluded. Subjects were then be excluded if they had taken antibiotics or probiotics in the last seven days, have incomplete medical records, or did not enroll in the study. Information from both children and their parents, regarding the patient biodata, hospital admission history of the patient, previous surgical procedures of the patient, oral hygiene habits, for example, tooth brushing and the medical tests which are performed in hospital during the stay of the patient, was gathered using a structured data collection form. Mostly commonly prescribed antibiotics were used for gastroenteritis. In taking a decision as to the prescribing of antibiotics, hospital indicators such as laboratory test results (especially culture sensitivity tests), past medication history, current symptoms and physical condition at time of admission were employed. An informed consent was obtained from the parent/guardian to collect additional data from the child by administering a structured questionnaire. The questionnaire covered the person's name, age, sex, and symptoms like diarrhea, vomiting, fever, and abdominal cramps. Data were analysed using SPSS version 21.0. Descriptive statistics were used to summarize the data. Categorical variables (e.g., gender, residence, antibiotic use, dehydration status, socioeconomic level) were presented as frequencies and percentages. Continuous variables (e.g., age, weight, fever duration, hospital stay length) were expressed as mean ± standard deviation (SD) or median with interquartile range (IQR), depending on the distribution. To assess associations between categorical variables, the Chi-square test was used. For continuous variables, independent sample t-tests or ANOVA were applied where appropriate. A p-value ≤ 0.05 was considered statistically significant. This study was conducted following ethical principles from the Institutional Review Board (IRB: KMC/RERC/118), and informed consent obtained from all participants.

RESULTS

The study included 200 pediatric patients with gastroenteritis, with a mean age of 4.5 ± 2.3 years and weight of 14.2 kg. Dehydration was common, with 50% having severe dehydration, and 60% experienced fever, while 75% had vomiting. The average duration of diarrhea was 3.5 days. Antibiotic use was reported in 60% of cases, with 75% of those being inappropriate. Approximately 65% of the children required intravenous rehydration, and the average hospital stay was 24.2 hours. These findings highlight the prevalence of dehydration, inappropriate antibiotic use, and the need for IV rehydration in managing pediatric gastroenteritis see Table 1.

Table 1: Demographic Characteristics of Pediatric Gastroenteritis Patients

Variables	Frequency (%) / Mean ± SD
Age (Years)	4.5 ± 2.2
Gender	
Male	200 (100)
Weight (Kg)	14.2 ± 4.1
Dehydration Status	
Mild	30 (15)
Moderate	70 (35)

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Severe	100 (50)
Fever (Present)	120 (60)
Vomiting (Present)	150 (75)
Abdominal Pain (Present)	140 (70)
Diarrhea Duration (Days)	3.5 ± 1.7
Antibiotic Use (Yes)	120 (60)
Inappropriate Antibiotic Use	150 (75)
IV Rehydration Required	130 (65)
Hospital Stay (Hours)	24.2 ± 5.5

The study showed that 60% of pediatric gastroenteritis cases were treated with antibiotics, even though 80% were viral in origin, which need not be treated by antibiotics. Thus, the high level of inappropriate antibiotic use (75%) indicates that treatment is probably prescribed in the face of diagnostic uncertainty, symptoms severity. Bacterial gastroenteritis was only found to be justified to use antibiotics in 20% of cases. This underlines the necessity to strictly follow guidelines and provide diagnostic examination before giving antibiotic see Table 2.

Table 2: Antibiotic Use and Clinically Presumed Etiology in Pediatric Gastroenteritis Cases

Variables	Frequency (%)
Prevalence of Antibiotic Use	120 (60)
Clinical Presentation	
Viral Gastroenteritis (presumed)	160 (80)
Bacterial Gastroenteritis (presumed)	40 (20)

Multivariate regression analysis identified moderate-to-severe dehydration, fever, poor oral intake, and inappropriate antibiotic use as significant predictors of longer hospital stays in children with acute watery diarrhea. Dehydration increased the stay by 3.8 hours, fever by 2.6 hours, poor oral intake by 3.1 hours, and inappropriate antibiotic use by 3.7 hours. A presumed viral etiology reduced the stay by 2.2 hours, while higher body weight was linked to a shorter stay. Gender, residence, and vomiting had no significant impact see Table 3.

Table 3: Unadjusted and Adjusted Analysis of Clinical Characteristics Associated with Length of Hospital Stay

Variables	Mean LOS (Hours)	Unadjusted β (SE)	p-value	Adjusted β (SE)	p-value
Age (Years)	38.2	1.2 (0.4)	0.001**	0.9 (0.3)	0.001**
Male Gender	39.5	2.1 (1.1)	0.06	1.4 (1.0)	0.15
Weight (Kg)	37.0	-0.8 (0.3)	0.001**	-0.6 (0.2)	0.02*
Urban Residence	35.6	-1.5 (1.2)	0.21	-0.9 (1.1)	0.40
Fever Present	41.3	3.0 (1.0)	0.001**	2.6 (0.9)	0.004**
Moderate-to-Severe Dehydration	45.8	4.5 (1.2)	0.001**	3.8 (1.1)	0.001**
Vomiting	36.4	1.1 (0.9)	0.23	0.8 (0.8)	0.31
Poor Oral Intake	44.2	3.9 (1.1)	0.001**	3.1 (1.0)	0.001**
Viral/bacterial	36.5	-2.6 (1.0)	0.008	-2.2 (0.9)	0.01*
Inappropriate Antibiotic Use	42.7	4.2 (1.2)	0.001**	3.7 (1.1)	0.001**

Unadjusted and adjusted analyses show that dehydration, fever, vomiting, and inappropriate antibiotic use are significant factors influencing the need for intravenous (IV) rehydration in children with gastroenteritis. Dehydration remained the strongest predictor (adjusted OR = 3.50, $p < 0.001$), followed by fever (adjusted OR = 1.87, $p < 0.001$) and inappropriate antibiotic use (adjusted OR = 2.75, $p < 0.001$). Vomiting was not statistically significant after adjustment (adjusted OR = 1.35, $p = 0.07$), and age, weight, and presumed viral etiology had no strong impact on IV rehydration need see Table 4.

Table 4: Unadjusted and Adjusted Analysis of Clinical Characteristics and Need for Intravenous Rehydration After 24 Hours in Children with Gastroenteritis

Clinical Characteristics	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	p-value
Age (Years)	1.02 (0.98 - 1.06)	1.01 (0.98 - 1.05)	0.62
Gender (Male)	1.40 (1.05 - 1.86)	1.25 (0.92 - 1.70)	0.16
Weight (Kg)	1.05 (1.00 - 1.09)	1.02 (0.98 - 1.06)	0.35
Presence of Dehydration	4.10 (3.20 - 5.27)	3.50 (2.68 - 4.61)	0.001**
Fever (≥ 38°C)	2.15 (1.65 - 2.82)	1.87 (1.38 - 2.54)	0.001**
Vomiting	1.60 (1.18 - 2.17)	1.35 (0.98 - 1.85)	0.07
Duration of Diarrhea (Days)	1.07 (1.02 - 1.12)	1.04 (1.00 - 1.09)	0.15
Viral/Bacterial	0.50 (0.37 - 0.67)	0.55 (0.39 - 0.77)	0.001**
Inappropriate Antibiotic Use	3.05 (2.15 - 4.29)	2.75 (1.88 - 4.07)	0.001**

DISCUSSION

A tertiary care hospital investigated the clinical characteristics and treatment methods along with factors that affect hospital outcomes in acute watery diarrhea patients among children.This study presents crucial information about dehydration-related impact and antibiotic misuse levels plus hospital resource management trends in resource-constrained settings. The patients who experienced moderate-to-severe dehydration needed the longest hospitalization periods and required intravenous (IV) rehydration treatment [9, 10]. The study showed that more than 85% of our child participants suffered from moderate or severe dehydration thus resulting in prolonged hospital stays by 3.8 hours ($p < 0.001$) and a 3.5-times greater likelihood ($p < 0.001$) for IV rehydration. The findings match earlier work from Posovszky *et al.*, (2020) along with WHO recommendations which identify dehydration to be the main clinical factor that guides severe gastroenteritis treatment choices [11].Early detection and appropriate correction of dehydration remains crucial for minimizing both patient health deterioration and hospital expenses [12]. The presence of fever resulted in patients needing two additional hours of hospitalization while increasing the odds of IV rehydration to 1.87 times above baseline.The

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presence of fever in pediatric patients triggers closer clinical observation so healthcare providers decide to admit patients longer to hospital. Yeasmin *et al.,* (2022) developed comparable findings when they conducted research demonstrating febrile children received intensified hospital admission procedures [13]. A patient's inability to consume food from their mouth (+3.1 hours) prolongs hospitalization duration as reported by Vecchio *et al.,* (2021). This observation reaffirms their findings about problems encountering food intake requiring intravenous fluids as a consequence of nausea or fatigue [14].The usage of inappropriate antibiotics reached 75% among patients because most diarrhea cases proved to be viral (80%).The researchers found antibiotic misuse trends similar to the results of previous studies who studied pediatric diarrhea utilization [15, 16]. The administration of inappropriate antibiotics increased hospitalization duration by +3.7 hours while simultaneously increase the need for intravenous rehydration treatment by 2.75 times in our study.The research demonstrates the necessity to follow strict national and WHO guidelines while developing better diagnostic methods (such as stool cultures) and providing education to healthcare providers [17]. According to results the attribution of cases to viral causes led to reduced hospital stay duration by 2.2 hours because viral gastroenteritis has self-limiting characteristics similar to studies conducted by previous literature. Lighter patients remained at the hospital for shorter periods when compared to heavier patients but the association was slight.Strong nutrition may reduce recovery time in children by helping their immune responses and storing extra energy [18, 19].The adjusted analysis did not link IV rehydration to vomiting occurrence although this symptom was found in three out of four patients.Possibly because vomiting symptomatically overlaps with dehydration effects and providers managed nausea effectively with antiemetics.The independent influences of age, gender and residence location failed to produce significant effects on the study outcomes.The research findings from other South Asian studies confirm that demographic variables lose their significance after healthcare severity reaches certain clinical levels [20].This study has several limitations. First, it was conducted at a single center, which may limit the generalizability of the findings to other settings.Second, the study design was observational, and causality between antibiotic use and clinical outcomes cannot be established.Third, diagnostic confirmation of etiologies was limited due to resource constraints, which may have led to misclassification.Lastly, data on long-term outcomes were not collected, which restricts the ability to assess the prolonged impact of antibiotic usage.

CONCLUSIONS

Antibiotic prescription rates for pediatric gastroenteritis are extremely high and alarmingly, the majority of them are inappropriate. Understanding on the part of healthcare providers helps reduce antibiotic use that is without clinical indication.

Authors Contribution

Conceptualization: MAB
Methodology: UB, PK, AAK
Formal analysis: UB, MZ
Writing, review and editing: HIS, MZ

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] Florez ID, Niño-Serna LF, Beltrán-Arroyave CP. Acute infectious diarrhea and gastroenteritis in children. Current Infectious Disease Reports. 2020 Feb; 22: 1-2. doi: 10.1007/s11908-020-0713-6.

[2] Guarino A, Aguilar J, Berkley J, Broekaert I, Vazquez-Frias R, Holtz L *et al.* Acute gastroenteritis in children of the world: what needs to be done?. Journal of Pediatric Gastroenterology and Nutrition.2020 May; 70(5):694-701.doi:10.1097/MPG.0000000000002669.

[3] Kumari H, Kumar K, Kumar G, Sharma N. Acute gastroenteritis: Its causes, maintenance, and treatment. Journal of Pharmaceutical Negative Results. 2022 Dec; 13(8): 5064-78.

[4] Szajewska H, Guarino A, Hojsak I, Indrio F, Kolacek S, Salvatore S *et al*. Use of probiotics for the management of acute gastroenteritis in children: an update. Journal of Pediatric Gastroenterology and Nutrition.2020Aug;71(2):261-9.doi:10.1097/MPG.0000000000002751.

[5] Adeyemi OO, Alabi AS, Adeyemi OA, Talabi OT, Abidakun OM, Joel IY *et al.* Acute gastroenteritis and the usage pattern of antibiotics and traditional herbal medications for its management in a Nigerian community. PLOS One.2021Oct;16(10): e0257837. doi: 10.1371/journal.pone.0257837.

[6] Stanyevic B, Sepich M, Biondi S, Baroncelli GI, Peroni D, Di Cicco M. The evolving epidemiology of acute gastroenteritis in hospitalized children in Italy. European Journal of Pediatrics.2022Jan:1-0.doi: 10.1007/s00431-021-04210-z.

[7 Crawford C, Anderson M, Cooper G, Jackson G, Thompson J, Vale A *et al.* Overdose in young children treated with anti-reflux medications: Poisons

DOI: https://doi.org/10.54393/pjhs.v6i6.3095

enquiry evidence of excess 10-fold dosing errors with ranitidine. Human & Experimental Toxicology.2018 Apr; 37(4): 343-9. doi: 10.1177/0960327117705430.

[8] Arnolda G, Hibbert P, Ting HP, Molloy C, Wiles L, Warwick M *et al.* Assessing the appropriateness of paediatric antibiotic overuse in Australian children: a population-based sample survey. BioMed Central Pediatrics.2020 Dec; 20: 1-8. doi: 10.1186/s12887-020-02052-6.

[9] Salência-Ferrão J, Chissaque A, Manhique-Coutinho L, Kenga AN, Cassocera M, de Deus N. Inappropriate use of antibiotics in the management of diarrhoea in children under five years admitted with acute diarrhoea in four provinces of Mozambique 2014-2019.BioMed Central Infectious Diseases.2025Feb; 25(1): 209. doi: 10.1186/s12879-025-10597-z.

[10] Viegelmann GC, Dorji J, Guo X, Lim HY. Approach to diarrhoeal disorders in children.Singapore Medical Journal.2021Dec;62(12):623.doi:10.11622/smedj.2021234.

[11] Posovszky C, Buderus S, Classen M, Lawrenz B, Keller KM, Koletzko S. Acute infectious gastroenteritis in infancy and childhood. Deutsches Ärzteblatt International.2020Sep;117(37):615.doi:10.3238/arztebl.2020.0615.

[12] de Lusignan S, Sherlock J, Ferreira F, O'Brien S, Joy M. Household presentation of acute gastroenteritis in a primary care sentinel network: retrospective database studies. BioMed Central Public Health. 2020 Dec; 20: 1-2. doi: 10.1186/s12889-020-08525-8.

[13] Yeasmin S, Hasan ST, Chisti MJ, Khan MA, Faruque AS, Ahmed T. Factors associated with dehydrating rotavirus diarrhea in children under five in Bangladesh: an urban-rural comparison. PLOS One. 2022Aug;17(8):e0273862.doi:10.1371/journal.pone.0273862.

[14] Vecchio AL, Conelli ML, Guarino A. Infections and chronic diarrhea in children.The Pediatric Infectious Disease Journal.2021Jul;40(7):e255-8.doi:10.1097/INF.0000000000003182.

[15] Ahmad SA and Morsy AT. Pathogens diarrhea in children, risks and treatment. Journal of the Egyptian Society of Parasitology.2022Aug;52(2):287-94.doi:10.21608/jesp.2022.257457.

[16] Khurana S, Gur R, Gupta N. Chronic diarrhea and parasitic infections: Diagnostic challenges.Indian Journal of Medical Microbiology.2021Oct;39(4):413-6.doi: 10.1016/j.ijmmb.2021.10.001.

[17] Omar M, Kassem E, Anis E, Abu-Jabal R, Mwassi B, Shulman L *et al.* Factors associated with antibiotic use in children hospitalized for acute viral gastroenteritis and the relation to rotavirus vaccination .Human Vaccines & Immunother-apeutics.2024 Dec;20(1):2396707.doi:10.1080/21645 515.2024.2396707.

[18] Leung AK and Hon KL. Paediatrics: how to manage viral gastroenteritis. Drugs in Context.2021Mar;10:2020-11. doi: 10.7573/dic.2020-11-7.

[19] Uddin MS, Rahman MM, Faruk MO, Talukder A, Hoq MI, Das S *et al.* Bacterial gastroenteritis in children below five years of age: a cross-sectional study focused on etiology and drug resistance of Escherichia coli O157, Salmonella spp., and Shigella spp.Bulletin of the National Research Centre.2021Dec;45:1-7.doi:10.1186/s42269-021-00597-9.

[20] Farfán-García AE, Imdad A, Zhang C, Arias-Guerrero MY, Sánchez-Álvarez NT, Iqbal J *et al.* Etiology of acute gastroenteritis among children less than 5 years of age in Bucaramanga, Colombia: A case-control study.PLOS Neglected Tropical Diseases. 2020Jun;14(6):e0008375.doi:10.1371/journal.pntd.0008375.