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Defiance On the Implementation of WHO-guidelines: Antibiotic Use in under Five Years Children with Acute Gastroenteritis in District Hospital

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Background: According to WHO guidelines, antibiotic should not be used for acute gastroenteritis in children unless there is accompanying bacterial infections. Irrational use of antibiotics contributes to bacterial drug resistance, adverse drug reactions and unnecessary cost. There are few studies in Africa that examined the effects of using antibiotics among children under five years old with acute gastroenteritis. This study aimed to describe rational use of antibiotherapy among children under five years with acute gastroenteritis at Remera Rukoma District Hospital.
Methods: This study was prospective descriptive using a structured questionnaire to collect data. The study's participants were the files of children under five years diagnosed with acute gastroenteritis who visited Remera Rukoma District Hospital from 1st February 2023 to 28th February 2024. A total 110 patients' e-files met the criteria from 253 patients attended the facility

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suffering from gastroenteritis, and data were analyzed using SPSS version 26.0. The study compared the irrational and rational use of among under five years children suffering from gastroenteritis.

Results: This study found that a high percentage of laboratory investigations (70%) were performed after initiation of a treatment. The comparison of irrational and rational use of antibiotics showed that irrational use of antibiotics was 3.54 times higher the rational use. The majority of patients were suffering from watery diarrhea and the frequency of irrational use of antibiotics was also high in this group.

Conclusion: The rate of irrational use of antibiotics in under fiveyear children was more than three times higher than rational use of antibiotics.

Recommendation: The institution should train the health professionals to adhere to the guidelines and frequent auditing the diagnosing and treatment process of this vulnerable population. The management should monitor the effects of this defiance leading to drug resistance.

Keywords: Gastroenteritis, antibiotics in under five; diarrhea treatment; guidelines; rational use of antibiotics; antibiotherapy; defiance.

1. INTRODUCTION

Acute gastroenteritis (AGE) is one of the most common health issues worldwide, with high rate of mortality and morbidity in children, especially in developing countries [1]. In developing countries, most cases of AGE are caused by a rotavirus which doesn't require antibiotic treatment [2]. The World Health Organization (WHO) and Integrated Management of Childhood Illness (IMCI) guidelines, recommended that Non-Bloody Diarrhea (NBD) should be managed with oral rehydration solution and Zinc while antibiotic treatment should be used only for dysenteric diarrhea or in the presence of blood in the stool [3]. Irrational use of antibiotics is when there is failure of adherence to treatment guidelines for prescribing antibiotic for non-specific diseases such as AGE and non-bacterial infection [4]. The use antibiotic irrationally will develop antibiotic resistance, adverse drug reaction, unnecessary cost of therapy and it may also rise the incidence of adverse effect of antibiotics such as mortality, morbidity, drug toxicity [3]. In recent time, antibiotic resistance was increased worldwide and declined the sensitivity of antibiotics to infection diseases [5]. Globally, around 700,000 deaths occur yearly due to antibiotic resistance (ABR) [5]. In Thailand, a study conducted on irrational antibiotic use and distribution in the Thai Community by Pumtong et al., in 2020, found that around 55.2% cases of irrational use of antibiotic in NBD management were reported [6] and a similar study done in India revealed that the antibiotics were prescribed irrationally at 71%. According to the study done in Kenya 2009-2016, antibiotics were prescribed irrationally in children with NBD (34%) either over prescription, under prescription, or inappropriate choice of antibiotics and it was also found that 2-5 of every 10 cases of NBD antibiotics were prescribed inappropriately [5]. A similar cross-sectional study assessing antibiotic prescribing for management of diarrhea in Tanzania reported that in about 54.4% of children with non-bloody diarrhea, antibiotics was prescribed inappropriately [7]. There is need to properly adherence to WHO- IMCI guidelines recommendations would help to avoid unnecessary antibiotic use.

2. MAIN CAUSES OF ACUTE GASTROENTERITIS

Gastroenteritis has three main causative agents such as: viruses, bacteria and parasite agents [8]. Viruses such as rotavirus, norovirus, adenovirus, enterovirus, coronavirus count 75% cases of AGE in children and bacteria such as shigella, Enteropathogenic Escherichia coli(EPEC), vibrio cholera, campylobacter jejuni, salmonella typhi count 20% cases of AGE in children while parasites such as giardia lamblia, entamoeba histolytica, cryptosporidium counts 5% cases of AGE in children under five years old [9]. In developing counties rotavirus is highest cause of acute gastroenteritis in children under five years where rotavirus cause 25 million cases of AGE, 2 million of hospitalization and about 611000 mortality annually globally while norovirus count 19.5% cases of AGE [10].

Though, in children bloody diarrhea is mostly caused by shigella in developing countries while bacterial infections etiology depends on geographical areas [10]. In Africa, it was showed that four agents (rotavirus, Cryptosporidium,

enterotoxigenic Escherichia coli (ETEC) producing heat-stable toxin, and Shigella account for the reason of infectious diarrhea in African and Asian children under 5 years old. Bacterial infections have a particular clinical features; high fever, abdominal pain, blood and white blood cells in stool(WBC) [3].

3. CLINICAL FEATURES OF ACUTE GASTROENTERITIS

Diarrhea is the main signs of acute gastroenteritis [9]. Diarrhea is defined as increase in frequency of watery stool caused by imbalance secretion of salts and absorbed water in intestine [8]. According to the definition of WHO, diarrhea is the passage of losing three or more watery stool per day, but for breastfeeding infants, diarrhea is considered when they have more than 6 to 8 stools per day [8]. The symptoms of dehydration are the existence of mucus and blood in the stool which is definition of diarrhea unrelatedly of rate of the stool and volume.

Diarrhea is classified according to its duration and cause; Acute diarrhea last for less than 2 weeks (14 days) while persistent diarrhea last for more than 2 weeks and chronic diarrhea considered when duration last more than 30 days [11]. Infectious diarrhea and non-infectious diarrhea are classified according to its pathophysiological mechanism. Infective diarrhea is characterized by imbalance of electrolytes and failure of circulatory system due to excessive loss of fluids, vomiting leading to dehydration, abdominal pains and fever [11].

Diagnosis: Diagnosis of acute gastroenteritis can be made clinically means of symptoms, signs and investigations [3]. The evidence should be checked about latest contact person with gastroenteritis, nature, stool frequency, vomiting, travel, urine output, fever, abdominal pain, fluid intake and antibiotics use which may cause diarrhea [12]. Gastroenteritis can be also diagnosed by stool examination, stool culture and blood culture. Stool studies should be obtained from the patients with suspected blood or mucus in stool, immune compromised children, and samples have to be cultured for bacterial and tested for virus pathogens and stool culture is standard for revealing the causative agents in bacterial gastroenteritis [2]. Laboratory investigations should also have considered in diagnosis of gastroenteritis as viral or bacterial confirmatory which will reduce/ prevent unnecessary antibiotic use [13]. A child with rotavirus infection is defined as having 8% of dehydration where serum urea increased, weight loss, skin change in color and mild metabolic acidosis and this is confirmed by using methods for rapid antigen detection such as enzyme interconnected immunosorbent assay [14].

Management and treatment: WHO guidelines for treatment of acute gastroenteritis in children under five years stated that the use of antibiotics are not needed but antibiotics can be used for specific pathogens [3]. Dysentery diarrhea characterized by abdominal pain and presence of blood in the stool, antibiotic treatment should be considered [3]. Also prolonged diarrhea, small intestine bacteria overgrowth, toxic state, diarrhea associated by antibiotic, fever and increased inflammatory markers; those clinical indications antibiotic treatment should have considered. WHO currently recommends also the use of antibiotic in acute bloody diarrhea in young children [15]. WHO guidelines for intravenous rehydration therapy for children with severe dehydration and children who can drink can be given ORS and also zinc supplement can be taken by children with acute gastroenteritis [9]. While Ministry of health recommends the use of antibiotic in persistent diarrhea, shigellosis, amoebiasis such as ciprofloxacin as first line and other alternatives are metronidazole, tetracycline, streptomycin, chloramphenicol, amoxicillin, sulfonamides [11]. WHO guidelines for Integrated Management of Childhood Illness recommend that antibiotic used for only dysentery or bloody diarrhea and ciprofloxacin recommended as first line drug [5]. While recommendation of westerly diarrhea management is ORS and zinc [5]. WHO has improved treatment guidelines for AGE and healthcare worker [16]. The use of ORS, breast feeding, intravenous fluids and zinc tablets which provide low cost and helpful involvements [16]. Guidelines explained by World Health Organization, indicate that all episode of diarrhea in children should be managed by ORS and zinc supplement and providing proper food and water hygiene, hand washing will prevent 93% of deaths rate caused by diarrhea [7]. Ministry of Health (MoH) of Rwanda guidelines indicate that, antibiotic is not recommended in management of AGE even if there is uncomplicated viral or bacterial gastroenteritis, all cases of diarrhea receive zinc and ORS while diarrhea greater than 14 days ORS may be changed to IV regimen [17]. However, antibiotic should be indicated in exception of bloody diarrhea or persistency diarrhea and detected shigellosis, amoebiasis,

cholera and giardiasis [18]. In developing country based on clinical presentation, Tanzania use WHO, IMCI, National standard treatment and essential medicine list guidelines for management of childhood diarrhea recommend that ORS and zinc for AGE while antibiotics are recommended for chronic diarrhea and bloody diarrhea. Such a metronidazole, ceftriaxone, ciprofloxacin and cotrimoxazole [7].

Irrational use of antibiotics for acute gastroenteritis management: Based on research conducted in Tanzania revealed that 80% of children with non-dysentery diarrhea or non-bloody diarrhea received antibiotics and the guidelines and recommendations in management of AGE in children is variations due to prescription of antibiotic depends on prescribers [19]. Further studies done in Northern Tanzania about antibiotic prescribing practice in management of cough and diarrhea showed that 80% of children with AGE receive antibiotics inappropriately and children with cough receive antibiotic in 68.9% inappropriate. Macrolides, penicillin's, sulphonamides and aminoglycosides was the antibiotic prescribed [7].

Similar study conducted at Tamale teaching hospital, a tertiary referral health facility in northern Ghana region, that was focusing on to determine the clinical presentation and management of children under 5 years old with AGE found that 84% of patients receive antimalarial therapy with negative malaria parasite. While 95% of children receive antibiotics for AGE, about 75% of children receive at least two or more antibiotic for AGE treatment [19]. Similar study done in Ghana found about improved childhood diarrhea treatment practice showed that inappropriate antibiotics use in childhood diarrhea remain high. They found that use of antibiotics for management of non-bloody diarrhea reduced from 66.2% to 38.2% it seemed that the incorrect antibiotic use for management of childhood diarrhea required to be reduced [13].

Antibiotics use among children under five years with acute gastroenteritis: In the research conducted in Abakaliki Nigeria about overuse of antibiotics in management of watery diarrhea in children showed that 17% of children receive anti diarrhea drugs and 87% of children with AGE received antibiotics, most antibiotic used was ciprofloxacin but also gentamicin and metronidazole was used [16]. Similar study done in eight countries such as Bangladesh, Brazil, India, Nepal, Pakistan, Peru, South Africa and the United Republic of Tanzania reported that 44.2% of antibiotic treatment for non-bloody diarrhea and also antibiotic prescribed at 75.25% for bloody diarrhea, but highest antibiotic use in children with diarrhea was in South Asia [12].

In the research conducted at Chennai, India about factors affecting antibiotic prescribing pattern in pediatric services and it revealed that antibiotic was prescribed in management of acute diarrhea. As compared to the other antibiotics penicillin group, two and third generation of cephalosporins was antibiotic prescribed in 43.9% and 4.9% respectively [20]. Based on study conducted in rural district in Uganda, that focusing on an evaluation of antibiotics prescribing practice showed that about 27% of antibiotic prescribed follow national treatment guidelines while about 42% of antibiotic prescription not comply on national treatment guidelines of Uganda [21]. Similar study conducted by E. Bruzzese et al 2018 focusing about antibiotic treatment of acute gastroenteritis in children revealed that about 12% cases antibiotic was prescribed unnecessary for AGE. The most antibiotics prescribed unnecessary was cefixime, ceftriaxone, ofloxacin, they also showed the overuse of antibiotics in developed countries [3]. Study conducted in Northern Ethiopia by H. Mezgebe et al focusing on antibiotics prescribing pattern in pediatric unit of Ayder referral hospital showed that the antibiotics prescribed in childhood illness where antibiotics prescribed in number of five per patients. The children between 1-5 years were given antibiotics in 37.8% while those children with less than one-year-old received antibiotics in 36.6% and prescribed antibiotics were gentamicin, ampicillin and ceftriaxone [3].

Laboratory examinations and time of receiving treatment in children with acute gastroenteritis: When a patient with acute diarrhea is received, supplementary laboratory investigations are unnecessary, however, stool cultures are indicated in cases of dysentery instead of acute, watery diarrhea for immune-competent children. There are also certain laboratory investigations that are very important in ruling out other underlying conditions or diagnoses [22]. I the study done in for 424 cases, only 15,5% had a stool culture ordered before treatment and 10.6% of the 15.5 %, their stool specimens were positive, two with *Shigella sonnei*, two with *Vibrio cholerae* Ogawa, and

three with *E. coli* [23]. In the study by Eugenia et al. suggested that though antimicrobial prescription is empiric, in many condition waiting laboratory investigations to confirm the decision to appropriately manage the patients is appropriate [3]. This was consistent with findings of a study from Pakistan which heighted that the presence of blood stool examined before prescription of antibiotics [24]. Laboratory studies should be performed in children who are severely dehydrated and children who are receiving intravenous rehydration therapy. Serum electrolyte levels should also be obtained in children who show signs of hypernatremia or hypokalemia [25].

Rate of rational and irrational use of antibiotic in children under five years with acute gastroenteritis: To understand the use antibiotics in under five year children, it is very important to assess whether the prescription was rational/appropriate or irrational/ inappropriate. The World Health Organization (WHO) (1992) defined rational or appropriate use of antimicrobials as prescribing antimicrobials for managing an invasive bacterial-type, bloody diarrhea or not prescribing antimicrobials for managing a watery type or non-bloody diarrhea while irrational or inappropriate use of antimicrobials was defined as prescribing antimicrobials in a watery, non-bloody diarrhea or not prescribing antimicrobials for an invasive bacterial-type or bloody diarrhea [23]. In a study conducted in Thailand showed that 116 (27.4%) cases were appropriately managed with antibiotics while 308 (72.6%) cases were inappropriately treated according to treatment guidelines. In this study, no case of bloody diarrhea was under-prescribed in relation to antimicrobials. On the basis of the rigorous WHO guidelines for the treatment of diarrhea, 72.6% of children received inappropriate antimicrobials. Hence 27.4% prevalence of appropriate use of antimicrobials in this study was lower than the72.6% [23].

The routine use of antimicrobial agents for treating diarrhea wastes resources and might lead to increased antimicrobial resistance. Even when a bacterial cause is suspected in an outpatient setting, antimicrobial therapy is not usually indicated among children because the majority of cases of acute diarrhea are self-limited and not shortened by antimicrobial agents. Exceptions to these rules involve special needs of individual children (e.g., immune-compromised hosts, premature infants, or children with underlying disorders). Information regarding appropriate antimicrobial therapy of bacterial and parasitic causes of acute infectious diarrhea is available [26]. In the study conducted in Kenya findings reported that more than 95% of diarrhea clinic visits did not warrant antibiotics. The study found that antibiotics were inappropriately prescribed for 2 to 5 of every 10 cases of non-dysentery diarrhea [5]. A cross-sectional study assessing antibiotic prescribing practice for the management of diarrhea in Tanzania reported 54.4% of children with acute watery diarrhea was prescribed with antibiotics inappropriately [7]. Similar studies in India and Thailand reported antibiotic overuse of 71 and 55.2% respectively (4,29). According to the research done in urban public health services in Burkina Faso about antibiotics prescribed to febrile under five children's outpatients, it revealed that 60% of antibiotics prescribed inappropriately in children with diarrhea. In low income country, they showed that 44.8% of over prescription of antibiotics in children with simple diarrhea (Savadogo et al., 2015). Similar study done by Kabayiza et al, focusing about AGE in Rwanda children under five years investigated by real time PCR showed that antibiotics was widely used in inappropriate way, about 42% of antibiotics was given to children with diarrhea without knowing causative agent [8].

Problem statement: In 2019, Efunshile et al. showed that there was irrational use of antibiotics among children under five years with acute gastroenteritis in Abakaliki, Nigeria, as over 85% of children received antibiotic prescription for diarrhea in health care centers [16]. Inappropriate antibiotic prescription for children under 5 years of life with AGE by clinicians is a well-recognized global problem [16].

The factors contributing to the use of antibiotics among children under five years old include poor adherence to WHO-IMCI guidelines, insufficient training on appropriate use of antibiotics in childhood diarrhea, physicians' prescriptions of antibiotic without laboratory findings, and patients' treatment expectations. Other studies confirmed the high prevalence of irrational antibiotic use in children with acute gastroenteritis where they showed that there were over prescription, under prescription and unnecessary antibiotic prescription. Irrational antibiotic prescription prevalence is high in developing countries including Rwanda (10, 11).This is a crucial problem that needs to be critically investigated.

4. STUDY OBJECTIVES

1. To determine the frequency of irrational use of antibiotic for Acute Gastroenteritis management at the District Hospital.
2. To measure the rate of using antibiotics among children under five years with acute gastroenteritis who attended the District Hospital.
3. To find out when laboratory examinations were done in children with acute gastroenteritis indication at the District Hospital.
4. To compare the rate of antibiotic usage for rational and irrational in children under five years with acute gastroenteritis at the District Hospital.

Rational of the study: Knowing about specific antibiotic prescription practices for the management of childhood diarrhea in primary care facilities and their driving factors. This will promote and to improve antibiotic use in childhood diarrhea. Additionally, knowing the management of Acute Gastroenteritis as well as the outcome in our settings will help to establish standard protocols to guide physicians in well management of acute gastroenteritis in children especially under 5 years old.

Study methods: This study was a one-year prospective descriptive design. The source of information was patients' medical e-files and hospital registers retrieved from hospital medical records system and archive of Remera Rukoma District Hospital corresponding to the study period.

Study setting: This study was conducted at Remera Rukoma District Hospital between February 2023 and February 2024.

Study population: The participants of this study were all children under 5 years attended Remera Rukoma District Hospital with acute gastroenteritis as diagnosis or differential diagnosis from the 1stFebruary 2023 to the 28th February 2024.

Inclusion and exclusion criteria: The study included under five years children diagnosed with acute gastroenteritis who were admitted at Remera Rukoma District Hospital from 1st February 2023 to the 28th February 2024 and excluded under five years without diagnosis of acute gastroenteritis and Children above five years with acute gastroenteritis.

Sampling procedure: A complete coverage sampling technique was used to obtain the sample for study. This sample was comprised of patients' e-file and hospital registers with the information of children who attended at Remera Rukoma District Hospital with AGE from 1stFebruary 2023 to the 28th February 2024 and questionnaire was used to collect data. In the period of the study, the facility received 512 children with acute gastroenteritis. This number stood for children who had acute gastroenteritis, bloody diarrhea, treated with antibiotics for bloody diarrhea, treated with antibiotics for watery diarrhea and those who didn't treated with antibiotics with acute gastroenteritis (AGE) during the research period, from 1st February 2023 to the 28th February 2024.

Data collection methods and techniques: Researcher used structured questionnaire to collect the data. After getting hospital ethical clearance, the researcher was directed to the matron of pediatric department. The researcher was given the register in which all patients files are recorded. Then, the researcher retrieved the patient identification number to access the e-files. After getting the patients files and records which met inclusion criteria, researcher filled the questionnaire with the required information from the files and records.

Data analysis procedures: After data collection, the data were coded and entered in the Statistical Package for the Social Science (SPSS) version 26.0 to be analyzed. Descriptive statistics (frequencies and percentages) were computed to respond to research objectives.

Frequency of irrational use of antibiotic for acute gastroenteritis management: The data were analyzed to determine the frequency of irrational use of antibiotic in management of acute gastroenteritis, patients' signs and symptoms and the rate of antibiotics use were cross-tabulated to find frequency distribution. The results showed the rate antibiotic use in under five years with acute gastroenteritis was 54 (49.1%) of antibiotics prescribed for acute watery-diarrhea while 41 (37.3 %) of antibiotics were prescribed for acute gastroenteritis with fever, vomiting, abdominal pain. However, children with bloody diarrhea were treated rationally as it is shown in Table 1.

Table 1. Irrational use of antibiotics in under five years and signs and symptoms

Rate of antibiotic use in under five years * Signs and symptoms Cross tabulation							
		Signs and symptoms					Total
		Diarrhea - Bloody	Diarrhea-Watery	Vomiting	AGE with fever, vomiting, abdominal pain	Bloody diarrhea with fever, vomiting, abdominal pain	
Rate of antibiotic use in under five years	Count	5	54	1	41	9	110
	% Within Rate of antibiotic use in under five years	4.5%	49.1%	0.9%	37.3%	8.2%	100.0 %
Total	Count	5	54	1	41	9	110
	% Within Rate of antibiotic use in under five years	4.5%	49.1%	0.9%	37.3%	8.2%	100.0 %

Table 2. Frequency distribution demographic characteristics

Age in months as per patient's file	Frequency	Percentage
	N= 110	%
1-12 months	61	55.5
13-24 months	29	26.4
25-36 months	10	9.1
37-49 months	5	4.5
50-62 months	5	4.5
Gender in the reviewed file		
Male	60	54.5
Female	50	45.5

Rate of using antibiotics among children under five years with acute gastroenteritis: One hundred and ten patients file were assessed and the majority of treated patients were aged between 1-12 months, 55, 5% followed by 13–24-month age range, and 26.4% while 37-49 months, 4, 5% and 50-62 months old, 4, 5% were the minorities. Among the recruited patient files, majority were for males with 54.5% while female accounted for 45.5% as it is shown in the frequency Table 2.

The rate of using antibiotics among the studied population was analyzed with regard to age, gender, and diagnosis found in the assessed patients files. Regarding the age, 22(36.1%) of 1-12 months age group received more than one antibiotic, 10(35.4%) of children aged between 13-24 months age received ampicillin. 50.0% of the 25-36 months age group received more than one antibiotic whereas children of 37-49 months of age 2(40%) were treated without antibiotic prescription and 2(40%) of 50-62 months age were treated with cefotaxime Table 3.

The researcher also sought to find out the rate of antibiotics use in under five years with regard to gender. The findings showed that male patients accounted for 36.7% of all prescriptions with the majority of prescribing more than two antibiotics at 61.1%, in this study female patients accounted for 32% of all prescription, and majority 66.7% received Cefotaxime as it can be seen in Table 4.

Finally, the researcher sought to find out the rate of antibiotic use in under five years with regard to their diagnosis other than acute gastroenteritis and diarrhea. The findings showed that the majority the diagnosis in the assessed patients' files were treated with no antibiotics. 3(42.9%) of respiratory diseases were treated with ampicillin, 2(40%) malaria cases were treated without antibiotics and 2(40%) treated with more than one antibiotic. 3(37.5%) of sepsis were treated with ampicillin while another 37.5% of children with sepsis did not receive any antibiotics. In under five years children with food intoxication, 3(42.9%) were treated with antibiotics while another 3(42.9%) were treated with no antibiotics. Additionally, other diagnosis had 30% of children who were treated with cefotaxime and more than one antibiotic respectively. Finally, those who had no diagnosis recorded in their files had 34.2% were treated with more than one antibiotic as it is shown in Table 5.

Table 3. Rate of antibiotic in under five years with acute gastroenteritis, age and antibiotic used

Age in month as per patient' file * Antibiotic used Cross tabulation									
			Antibiotic used						Total
			Ciprofloxacin	Metronidazole	Cefotaxime	Ampicillin	None	More than one antibiotic	
Age in month as per patient' file	1-12 months	Count	3	5	2	11	18	22	61
		% Within Age in month as per patient' file	4.9%	8.2%	3.3%	18.0%	29.5%	36.1%	100.0%
	13-24 months	Count	2	1	1	10	8	7	29
		% Within Age in month as per patient' file	6.9%	3.4%	3.4%	34.5%	27.6%	24.1%	100.0%
	25-36 months	Count	0	1	0	4	0	5	10
		% Within Age in month as per patient' file	0.0%	10.0%	0.0%	40.0%	0.0%	50.0%	100.0%
	37-49 months	Count	0	0	1	1	2	1	5
		% Within Age in month as per patient' file	0.0%	0.0%	20.0%	20.0%	40.0%	20.0%	100.0%
	50-62 months	Count	0	1	2	1	0	1	5
		% Within Age in month as per patient' file	0.0%	20.0%	40.0%	20.0%	0.0%	20.0%	100.0%
Total		Count	5	8	6	27	28	36	110
		% Within Age in month as per patient' file	4.5%	7.3%	5.5%	24.5%	25.5%	32.7%	100.0%

Table 4. Rate of antibiotic used in under five years with acute gastroenteritis, gender and antibiotic used

Gender in the reviewed file * Antibiotic used Cross tabulation									
			Antibiotic used						Total
			Ciprofloxacin	Metronidazole	Cefotaxime	Ampicillin	None	More than one antibiotic	
Gender in the reviewed file	Male	Count	3	5	2	16	12	22	60
		% Within Gender in the reviewed file	5.0%	8.3%	3.3%	26.7%	20.0%	36.7%	100.0%
		% Within Antibiotic used	60.0%	62.5%	33.3%	59.3%	42.9%	61.1%	54.5%
	Female	Count	2	3	4	11	16	14	50
		% Within Gender in the reviewed file	4.0%	6.0%	8.0%	22.0%	32.0%	28.0%	100.0%
		% Within Antibiotic used	40.0%	37.5%	66.7%	40.7%	57.1%	38.9%	45.5%
Total		Count	5	8	6	27	28	36	110
		% Within Gender in the reviewed file	4.5%	7.3%	5.5%	24.5%	25.5%	32.7%	100.0%

Table 5. Rate of antibiotic use in the diagnosis other than acute gastroenteritis

Diagnosis in the file other than gastroenteritis and diarrhea * Antibiotic used Cross tabulation									
			Antibiotic used						Total
			Ciprofloxacin	Metronidazole	Cefotaxime	Ampicillin	None	More than one antibiotic	
Diagnosis in the file other than gastroenteritis and diarrhea	Respiratory diseases	Count	0	0	0	3	2	2	7
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	0.0%	0.0%	0.0%	42.9%	28.6%	28.6%	100.0%
	Malaria	Count	0	0	0	1	2	2	5
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	0.0%	0.0%	0.0%	20.0%	40.0%	40.0%	100.0%
	Sepsis	Count	0	0	1	3	3	1	8
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	0.0%	0.0%	12.5%	37.5%	37.5%	12.5%	100.0%
	Food intoxication	Count	0	0	0	1	3	3	7
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	0.0%	0.0%	0.0%	14.3%	42.9%	42.9%	100.0%
	Others	Count	0	1	3	2	1	3	10
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	0.0%	10.0%	30.0%	20.0%	10.0%	30.0%	100.0%
	None	Count	5	7	2	17	17	25	73
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	6.8%	9.6%	2.7%	23.3%	23.3%	34.2%	100.0%
Total		Count	5	8	6	27	28	36	110
		% Within Diagnosis in the file other than gastroenteritis and diarrhea	4.5%	7.3%	5.5%	24.5%	25.5%	32.7%	100.0%

Table 6. Frequency distribution of laboratory examination

Status of laboratory examination	Frequency N=110	Percentage %
Laboratory examination done before receiving treatment	6	5.5
No laboratory examination done	27	24.5
Laboratory done after receiving treatment	77	70.0

Table 7. Comparison of irrational and rational use of antibiotics

Candidate eligibility to antibiotic * Treatment received Cross tabulation					
			Treatment received		Total
			Received antibiotics	No antibiotics received	
Candidate eligibility to antibiotic	Eligible for antibiotics	Count	18	5	23
		% Within Candidate eligibility to antibiotic	78.3%	21.7%	100.0 %
		% Within Treatment received	22.0%	17.9%	20.9%
	Not eligible for antibiotics	Count	64	23	87
		% Within Candidate eligibility to antibiotic	73.6%	26.4%	100.0 %
		% Within Treatment received	78.0%	82.1%	79.1%
Total		Count	82	28	110
		% Within Candidate eligibility to antibiotic	74.5%	25.5%	100.0 %
		% Within Treatment received	100.0%	100.0%	100.0 %

When laboratory investigation is mostly done in children with acute gastroenteritis: The researcher sought to find out whether prescription of antibiotic in the study participants followed the WHO-IMCI guidelines. The results showed that 70% of the laboratory investigation were done after initiation of antibiotic treatment, 24.5% of investigated patients file had no laboratory examination done whereas the minority, 5.5% had investigations done before receiving antibiotic treatment as shown in Table 5.

Rate of using antibiotic rational and irrational in children with acute gastroenteritis: The rate of rational and irrational use antibiotics in under five children with acute gastroenteritis were compared. The findings revealed that among 18(78.3%) of children who were eligible for antibiotic treatment, 22% received the treatment. However, in 64(73.6%) of children who were not eligible for antibiotic treatment, 78% of them received antibiotic treatment and this can be deduced in the Table 7.

5. DISCUSSION

This current study was a non-intervention descriptive quantitative. The results showed that the rate antibiotic use in under five years with acute gastroenteritis was at 49.1% in children with acute watery-diarrhea and this study strongly agreed with the study from which revealed that in 318 studied children, the 49 who only had non- bloody diarrhea were treated with antibiotics [27] while 37.3 % of antibiotics were prescribed for acute gastroenteritis with fever, vomiting, abdominal pain, however, children with bloody diarrhea were treated rationally. These findings shows that initiating of treatment was adhering WHO guidelines [3], and this was consistent with the findings from the study conducted in Tanzanian [19]. It was found that children with bloody diarrhea with fever, vomiting, abdominal pain, 8.2% and they were all treated with antibiotics and this group of children was treated rationally [15].

These findings are consistent with the findings form the study conducted in Ethiopia [2] and those from Tamale Teaching hospital which found that among the children who received antibiotic prescriptions, majority (75%) were given two or more antibiotics [19], though the Tamale Teaching hospital study did not examine this prescriptions regarding age, gender and patients' diagnosis. This current study also agreed with the study conducted in Nigeria (in a

Tertiary Hospital, Edo State) [28] and in Ghana which revealed that antibiotic polypharmacy prescription was commonly prescribed in under five years children treated at Kintampo Municipal Hospital [29,30].

The rates of rational and irrational use of antibiotics in under five children with acute gastroenteritis were compared [31,32]. These findings revealed that among 78.3% of children who were eligible for antibiotic treatment, 22% received the treatment. However, in 73.6% of children who were not eligible for antibiotic treatment, 78% of them received antibiotic treatment. This means that the rate of irrational use of antibiotics was 3.54 times as high compared to rational us of antibiotics in under five years children [8].

5. CONCLUSION

From the study, the patients with watery diarrhea were the majorities and the frequency of irrational use of antibiotics was also high which did not follow the WHO-IMCI guidelines. However, those with bloody diarrhea were treated according to the guidelines. Considering the frequency of antibiotic prescription, ampicillins, Cefotaxime were the mostly prescribed. Irrational antibiotic use in gastroenteritis and diarrhea, was found. Additionally, a high percentage of laboratory examinations were performed after the treatment was initiated.

6. RECOMMENDATIONS

This study recommends that health professionals should work together to adhere to WHO and national IMCI guidelines. Stronger regulatory norms such as audit of antibiotic use at the hospital level and policy and procedure controls during admission and treatment of patients with AGE. The institution should initiate the framework of supervising how health professionals are adhering to IMCI guidelines.

CONSENT

It is not applicable.

ETHICAL CONSIDERATION

Ethical clearance was not needed as it was a quality improvement assessment. The recorded information was kept confidentially and used for the current research purpose only. Only the researcher had the access to the study data and information. The names of the participants were kept anonymous by using patient initials and identification number instead of their names. After this study, the questionnaires and other paper records was properly kept for future reference.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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