

Antimicrobial Resistance in Chronic Diarrhea: A Case Report of Cefazolin-Resistant Enteric Infection

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ABSTRACT

Introduction: Antimicrobial resistance is an emerging global health challenge that may lead to treatment failure and prolonged illness. Although cefazolin resistance is relatively uncommon, it can complicate infectious disease management, including chronic diarrhea. **Case:** A 7-month-old girl presented with fever and chronic mucoid diarrhea. Despite treatment with multiple antibiotics, including cefazolin, metronidazole, and vancomycin, her symptoms worsened, with diarrhea increasing to seven episodes daily, accompanied by severe anemia and malnutrition. Antibiotic susceptibility testing revealed isolated cefazolin resistance (MIC = 64 µg/mL). After susceptibility-guided treatment with intravenous ciprofloxacin and supportive care, the patient improved significantly and was discharged after 10 days. **Discussion:** This case highlights the importance of considering antimicrobial resistance in children with persistent diarrhea who fail to respond to empirical antibiotic therapy. Cefazolin resistance likely contributed to treatment failure and clinical deterioration. Early microbiological investigation and susceptibility-guided therapy were essential to achieve clinical recovery and prevent further complications. **Conclusion:** Clinicians should consider cefazolin-resistant enteric infection in cases of chronic diarrhea with poor response to empirical treatment. Prompt culture and antibiotic susceptibility testing are crucial to guide appropriate antimicrobial therapy and improve patient outcomes.

Keywords: Antimicrobial resistance, case report, cefazolin resistance, chronic diarrhea, enteric infection.



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INTRODUCTION

Antibiotic resistance represents a major global health challenge, contributing to more than 1.27 million deaths each year and expected to cause over 10 million deaths annually by 2050.¹ According to the World Health Organization, antibiotic resistance is among the top ten global health threats. Addressing this issue requires prudent antibiotic use, novel therapeutic interventions, and ongoing research to prevent further spread of AMR.²

The 2019 GLASS (Global Antimicrobial Resistance and Use Surveillance System) results for Indonesia indicated an increase in antimicrobial resistance percentages among various bacteria, including *E. coli* and *K. pneumoniae*, with average resistance rates ranging from 26% to 56% for carbapenems, fluoroquinolones, and third-generation cephalosporins.^{3,4} Among the antibiotics

evaluated, resistance was most frequent against tetracycline (77.8%), while resistance to vancomycin (0.59%), penicillin (0.7%), ampicillin (1%), and cefazolin (1.34%) remained relatively uncommon.^{5,6} Considering the relatively low prevalence of cefazolin resistance reported in previous studies, this case highlights a rare antimicrobial resistance pattern. These findings emphasize the need for aggressive diagnostic evaluation, culture-guided antimicrobial therapy, and close follow-up to ensure effective infection control and prevent potential complications.^{7,8}

This case report presents a patient with chronic diarrhea associated with cefazolin resistance. Chronic diarrhea remains a common clinical presentation with a broad differential diagnosis, and antimicrobial resistance should be considered, particularly in cases with persistent symptoms despite treatment.

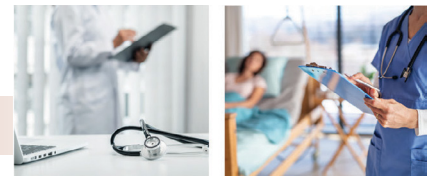
Our case describes a patient with chronic diarrhea due to a cefazolin-resistant bacterial infection, highlighting the importance of early microbiological evaluation, antimicrobial susceptibility testing, and timely targeted therapy to optimize patient outcomes.

CASE

A 7-month-old girl with fever and mucous and textured stools at least twice a day was hospitalized. She was fully conscious, with a body temperature of 36.6 °C, a pulse rate of 140 x/minute, and a respiratory rate of 24 x/minute. The child's parents had already seen three different doctors, and the patient received different antibiotics, such as cefazolin, metronidazole, and vancomycin. Management includes antibiotic therapy with supportive care. The antibiotics previously given were cefazolin 2 x 300 grams via parenteral administration and zinc 1 x 20

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grams a day. Unfortunately, the patient's diarrhea progressively worsened, with diarrhea to nearly seven episodes daily, accompanied by severe anemia and marked malnutrition. Given the progressive clinical deterioration, we promptly performed further laboratory investigations, including microbiological culture and antibiotic susceptibility testing (**Table 1 and Figure 1**).

The susceptibility test revealed resistance to cefazolin, suggesting that the previously administered antibiotic may have been ineffective against the causative pathogen. This resistance likely contributed to the persistence and worsening of the patient's diarrhea, emphasizing the importance of culture-guided antimicrobial therapy in managing chronic infectious diarrhea.

Then the patient underwent intensive care with another specific antibiotic, ciprofloxacin 10 mg/kg IV every 12 hours for 5 days. Supportive care was also required, including zinc supplementation and an isotonic saline bolus of 10 mg/kg over 30 to 60 minutes, with reassessment and a repeat bolus. After 10 days of effective treatment, the patient was declared diarrhea-free, marked by stool consistency becoming solid; the patient was then discharged from the hospital on July 27, 2022.

DISCUSSION

Antibiotics have revolutionized modern medicine and are widely regarded as one of the most significant medical advances of the twentieth century because of their effectiveness in combating bacterial infections.⁹ However, infections caused by antimicrobial-resistant organisms pose substantial clinical challenges, as they are more difficult to treat and are associated with an increased risk of severe morbidity and mortality.^{10,11}

Antimicrobial resistance to low-cost agents used in the management of invasive pediatric diarrhea is widespread among children under 10 years of age, with increasing resistance trends observed for fluoroquinolones and later-generation cephalosporins.^{12–14} In our patient, persistent diarrhea associated with cefazolin resistance represented a significant therapeutic challenge. Despite

Table 1. Hematology results.

Laboratory Examination	Results	Normal range	
Hemoglobin	7.6*	10.1–12.9	g/dL
Leukocytes	6,410	6,000–17,500	/uL
Hematocrit	22.8*	32–44	Vol%
Erythrocytes	2.82*	3.2–5.2	million/uL
Platelets	514,000*	150,000–450,000	/uL
MCV	81.1	73–109	fL
MCH	27.1	21–33	pg
MCHC	33.4	26–34	g/dL
RDW-CV	14.1	11.5–14.5	%
MPV	8.5	6.90–10.6	fL

Count			
Basophil	0	0–1	%
Eosinophil	1	1–5	%
Neutrophil rods	2	0–8	%
Neutrophil segment	16*	17–60	%
Lymphocytes	65	20–70	%
Monocytes	16*	1–11	%
Neutrophil	1.07*	1.5–7	Thousand/m
Total lymphocyte	4.19*	1–3.7	Thousand/m

Abbreviations: MCV: Mean corpuscular volume; MCH: Mean corpuscular hemoglobin; MCHC: Mean corpuscular hemoglobin concentration; RDW-CV: Red cell distribution width – coefficient of variation; MPV: Mean platelet volume.

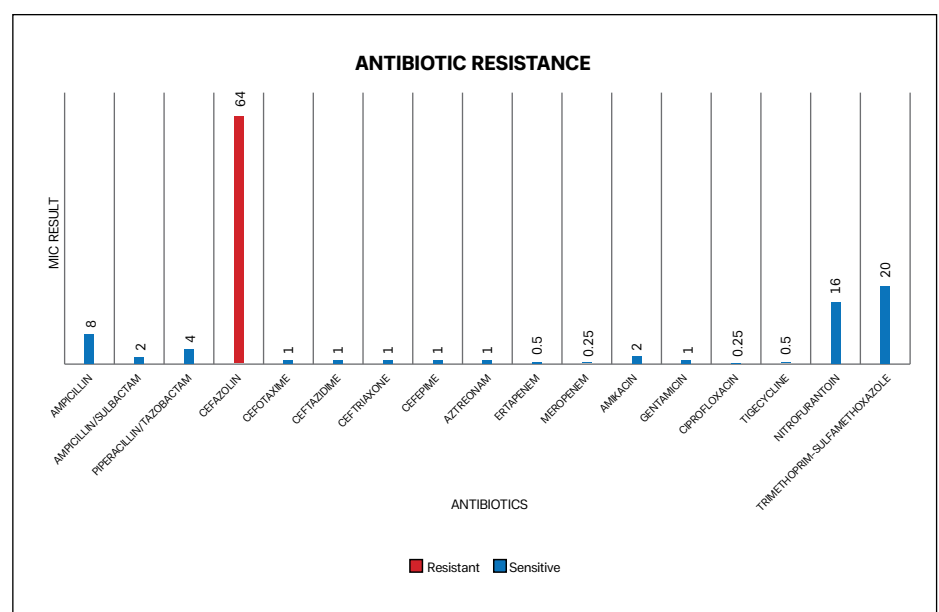
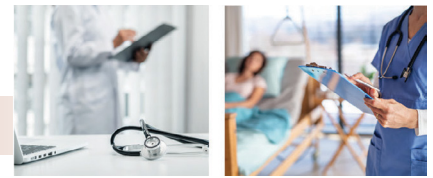


Figure 1. Antibiotic resistance level.



multiple antimicrobial agents, including cefazolin, metronidazole, and vancomycin, no substantial clinical improvement was observed until bacterial culture and antibiotic susceptibility testing were performed.¹⁵ This finding highlights the importance of microbiological evaluation in patients with prolonged diarrhea who fail to respond to empirical therapy.

Antimicrobial resistance is driven by multiple factors, including overuse and inappropriate use of antibiotics, inadequate infection control measures, and the limited availability of newer antimicrobial agents, which may increase reliance on older antibiotics and subsequently promote the emergence of resistant pathogens.¹⁶ In this case, the persistence and progression of symptoms despite repeated antibiotic exposure suggest that ineffective antimicrobial therapy may have contributed to ongoing infection and clinical deterioration, manifested by worsening diarrhea, severe anemia, and malnutrition.

Therefore, intensive management based on antimicrobial susceptibility results, together with close clinical monitoring and supportive care, is essential to prevent further complications and improve patient outcomes.¹⁷ Following identification of the resistance pattern, treatment was adjusted and continued with ciprofloxacin intravenously at 10 mg/kg every 12 hours for 5 days. Concurrent supportive therapy consisted of zinc supplementation and

isotonic saline resuscitation (10 mL/kg infused over 30–60 minutes), with repeated clinical evaluation and fluid replacement based on the patient's response. After initiation of targeted antimicrobial therapy and supportive care, the patient's clinical condition improved significantly, with decreased diarrhea frequency and progressive recovery of nutritional and hematological parameters.

CONCLUSION

This case highlights the clinical impact of cefazolin-resistant enteric infection in a child with chronic diarrhea, severe anemia, and malnutrition. Early microbiological evaluation and antibiotic susceptibility testing were crucial in identifying the resistance pattern and guiding targeted therapy, resulting in significant clinical improvement. These findings emphasize the importance of culture-guided antimicrobial management in patients with persistent diarrhea who fail to respond to empirical antibiotic treatment.

DECLARATIONS

Consent for Publication

Written informed consent for publication of this case report and any accompanying clinical data was obtained from the patient's legal guardian. A copy of the written consent is available for review by the Editor-in-Chief upon reasonable request.

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Author Contributions

G.S.M. conceived and designed the study and critically revised the manuscript. A.N.I., N.A.S.L., F.H., and H.N.S. collected and analyzed the clinical data and drafted the manuscript. Q.S. supervised the study, contributed to the interpretation of clinical findings, and provided critical revisions to the manuscript. All authors reviewed, approved, and agreed to be accountable for the final version of the manuscript.

Conflict of Interest

The authors declare that they have no financial or non-financial conflicts of interest related to this case report.

Declaration on the Use of Artificial Intelligence

The authors declare that artificial intelligence tools were used to assist with language editing and manuscript preparation. All authors have reviewed, verified, and approved the final content of the manuscript and take full responsibility for its accuracy and integrity.

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