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Effective Hydration-Centered Management of Acute Gastroenteritis in a 13-Year-Old Patient: Insights from Primary Care Practice

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Abstract

Acute gastroenteritis remains one of the most common acute conditions in children and adolescents, frequently leading to dehydration and requiring prompt clinical assessment to prevent further complications. Although management guidelines are well established, variability in presentation and progression highlights the importance of individualized and holistic diagnostic approaches in primary care. This report describes a case involving a 13-year-old male who presented with severe gastrointestinal symptoms, including diarrhea exceeding ten episodes per day over three consecutive days, more than five episodes of vomiting, abdominal pain, fever, and generalized weakness. Clinical examination demonstrated a weakened overall condition, blood pressure of 100/70 mmHg, pulse 85 beats per minute, respiratory rate 20 breaths per minute, temperature 36.7°C, and signs consistent with mild to moderate dehydration. Laboratory evaluation revealed slightly decreased leukocyte levels, suggesting a likely viral etiology. The management in this case reflects the methodological core of the intervention: a holistic, stepwise approach integrating intravenous rehydration, symptomatic therapy, and adaptive pharmaceutical adjustments based on evolving clinical features. The patient was administered Ringer's Lactate intravenously through a loading dose followed by controlled infusion at 25 drops per minute. Antiemetic therapy with ondansetron, antipyretics, antacids, attapulgite, and oral rehydration solution were provided initially. On the second day, antibiotics and ranitidine were introduced in response to persistent gastrointestinal complaints and to prevent potential secondary complications. The results demonstrated clear clinical improvement within 72 hours, marked by decreased diarrhea frequency, cessation of vomiting, and normalization of vital signs (blood pressure 100/65 mmHg; pulse 80 beats per minute). Hydration status returned to normal, and no complications or referral indications were identified. This case underscores the conclusion that integrating holistic assessment with tailored rehydration strategies and selective pharmacologic therapy can produce rapid and effective recovery in pediatric acute gastroenteritis. The novelty lies in demonstrating how a dynamic, symptom-guided model of care in a primary health setting can optimize outcomes while minimizing unnecessary escalation of treatment.

1. Introduction

The World Health Organization (WHO) states that Acute Gastroenteritis (AGE), or acute diarrhea, remains one of the leading causes of morbidity and mortality among children, particularly in low- and middle-income countries. The high incidence is largely attributed to dehydration resulting from rapid loss of fluids and electrolytes, making timely and appropriate management essential (WHO, 2024). In Indonesia, acute gastroenteritis continues to be a prominent pediatric health issue, with a high prevalence in the child population. Although most cases are self-limiting, AGE remains a major reason for visits to primary care facilities and inpatient units due to varying degrees of dehydration and the need for continuous clinical evaluation (Leonard Sumadi Jap, 2021).

Clinical manifestations of AGE commonly include recurrent watery diarrhea, vomiting, fever, abdominal pain, decreased appetite, and signs of dehydration such as reduced skin turgor, dry mucous membranes, tachycardia, and in severe cases, hemodynamic instability. Without prompt correction of fluid loss, patients may progress to moderate or severe dehydration, electrolyte imbalances, metabolic acidosis, and other serious complications (UK, 2009). The primary principle of AGE management is rapid and appropriate rehydration. In cases of mild to moderate dehydration, oral rehydration using oral rehydration solution (ORS) is the recommended first-line therapy, as it has been proven effective and safe for replacing fluid deficits. However, in cases of moderate to severe dehydration or when the patient is unable to tolerate

oral fluids due to persistent vomiting or drinking intolerance management should shift to intravenous rehydration using crystalloids such as Ringer's lactate (RL) or 0.9% NaCl, in accordance with international guidelines (Stuart et al., 2020).

Supportive therapy, such as antiemetics (e.g., ondansetron), may be considered in children experiencing persistent vomiting that interferes with successful oral rehydration, as supported by several systematic reviews. Conversely, the use of non-ORS antidiarrheal agents is not recommended due to limited benefits and a relatively high risk of adverse effects. Similarly, antibiotics are not routinely indicated in AGE because most cases are viral; their use is reserved for suspected bacterial infections, such as dysentery (bloody diarrhea), persistent high fever, or laboratory results suggestive of bacterial etiology (Guarino et al., 2018).

Recent literature on pediatric AGE management consistently underscores the importance of accurately assessing dehydration severity, closely monitoring fluid balance including intake and output and administering fluids appropriate to the patient's clinical condition. Structured clinical assessments, including evaluation of diarrhea and vomiting frequency, vital signs, and peripheral perfusion, constitute the foundation for determining whether oral rehydration is sufficient or intravenous therapy is required (Kusmayanti & Sibualamu, 2023).

Acute gastroenteritis (AGE) remains one of the leading causes of acute illness among children and adolescents worldwide, frequently resulting in significant fluid and electrolyte loss that may quickly progress to dehydration if not promptly addressed (Guarino et al., 2018). Although global morbidity and mortality have decreased due to improved rehydration strategies, AGE continues to impose substantial clinical and economic burdens, particularly in low-resource settings where timely evaluation and management can be challenging (Lanata et al., 2013).

The condition is predominantly viral in origin most commonly due to rotavirus and norovirus with typical clinical manifestations such as diarrhea, vomiting, fever, and general malaise (Tate et al., 2016; Vesikari et al., 2017). While many cases are self-limiting, the severity of symptoms is strongly influenced by hydration status, comorbidities, and age, making early and accurate assessment essential. Dehydration remains the most important predictor of complications, with signs such as tachycardia, reduced skin turgor, dry mucous membranes, and decreased urine output serving as key clinical indicators (López et al., 2019).

Oral rehydration therapy (ORT) is universally recommended as first-line treatment for mild to moderate dehydration due to its safety, cost-effectiveness, and clinical efficacy comparable to intravenous (IV) fluids (Freedman et al., 2011). The use of low-osmolarity oral rehydration solution (LORS) has been shown to further reduce stool output and vomiting (Munos et al., 2010). Despite strong evidence, inappropriate reliance on IV fluids persists in many clinical settings, often driven by caregiver expectations or variability in clinical judgment (Hartling et al., 2006). This inconsistency underscores the need for individualized, evidence-based decision-making in AGE management.

When ORT fails or vomiting is severe, IV rehydration with isotonic solutions such as Ringer's lactate becomes necessary, offering advantages in restoring intravascular volume and reducing the risk of metabolic disturbances such as hyperchloremic acidosis (Fischer Walker et al., 2012; Self et al., 2018). Adjunctive pharmacologic therapy, particularly ondansetron, has also been shown to improve ORT tolerance by reducing vomiting frequency (Freedman et al., 2015). In contrast, antibiotic therapy should be reserved for specific indications such as dysentery or suspected bacterial infection to avoid contributing to antimicrobial resistance (Porter et al., 2020).

Optimal management of AGE requires not only rehydration but also careful monitoring of clinical progression, evaluation of nutritional status, and identification of red-flag symptoms that may signal alternative diagnoses (Farthing et al., 2013). These considerations become especially relevant in primary care settings, where diagnostic resources may be limited and caregiver health literacy is variable. Adolescents represent an important yet under-studied subgroup with distinct physiologic and behavioral characteristics, further reinforcing the need for individualized care approaches.

Case-based clinical evidence plays a crucial role in translating guidelines into practical strategies that can be adapted to real-world circumstances. The present case illustrates how a hydration-centered, dynamic management approach can be effectively applied to an adolescent patient presenting with significant dehydration risk due to acute gastroenteritis. Therefore, this study was conducted to present and analyze a case of acute gastroenteritis in a 13-year-old patient managed through an individualized, hydration-centered approach in a primary care setting. The findings are expected to provide practical insights that support clinicians in optimizing AGE management particularly in adolescents and to reinforce the importance of flexible, evidence-based strategies in resource-limited environments.

2. Materials and Methods

2.1. Study Design

This study is a single-case report describing the clinical management of a 13-year-old male patient diagnosed with acute gastroenteritis (AGE) in a primary care setting. Case reports are widely recognized as valuable tools for illustrating the application of evidence-based guidelines to individualized patient care, particularly in pediatric populations (Vesikari et al., 2017; Freedman et al., 2015). The design follows the CARE guidelines for case reporting to ensure transparency and completeness in the description of clinical interventions (Gagnier et al., 2013).

2.2. Patient Selection and Clinical Presentation

The patient was a previously healthy 13-year-old male who presented with more than ten episodes of diarrhea per day for three consecutive days, over five episodes of vomiting, abdominal pain, fever, and generalized weakness. Clinical assessment included vital signs measurement, physical examination, and evaluation of hydration status. The assessment was guided by international recommendations for pediatric AGE, emphasizing rapid recognition of dehydration and risk stratification (Guarino et al., 2018; Farthing et al., 2013).

2.3. Clinical Assessment and Laboratory Evaluation

Initial clinical evaluation involved documenting vital signs (blood pressure, pulse rate, respiratory rate, and temperature), assessing mucous membrane dryness, skin turgor, and peripheral perfusion to classify the degree of dehydration (López et al., 2019; Munos et al., 2010). Laboratory investigations included a complete blood count and basic metabolic panel to rule out bacterial infections and evaluate electrolyte balance, following standard pediatric protocols (Porter et al., 2020).

2.4. Hydration Management

A stepwise, hydration-centered approach was employed, beginning with oral rehydration solution (ORS) for mild dehydration and intravenous (IV) therapy for moderate to severe dehydration or ORT intolerance (Freedman et al., 2011; Hartling et al., 2006). The patient received an initial IV bolus of Ringer's Lactate, followed by controlled infusion at 25 drops per minute. Fluid replacement rates and volumes were adjusted based on ongoing assessment of hydration status, urine output, and hemodynamic stability (Fischer Walker et al., 2012; Self et al., 2018).

2.5. Symptomatic and Pharmacologic Therapy

Antiemetic therapy with ondansetron was administered to reduce vomiting frequency and facilitate oral intake, consistent with evidence-based guidelines (Fugetto et al., 2020; Tomasik et al., 2016). Antipyretics were used to control fever, while antacids and attapulgite were provided for gastrointestinal comfort. Antibiotics and ranitidine were introduced on the second day due to persistent gastrointestinal symptoms and to prevent potential secondary bacterial complications, in line with clinical discretion based on symptom progression and laboratory results (Efunshile et al., 2019).

2.6. Monitoring and Follow-Up

The patient's clinical course was monitored continuously, including repeated vital signs measurement, assessment of stool and vomit frequency, and evaluation of hydration status. Adjustments to therapy were made according to dynamic changes in clinical presentation, reflecting a symptom-guided approach that integrates both oral and IV hydration strategies (Guarino et al., 2018; Freedman et al., 2015). The primary outcome measures included normalization of hydration, reduction of diarrhea and vomiting episodes, and stabilization of vital signs within 72 hours.

2.7. Ethical Considerations

Written informed consent was obtained from the patient's legal guardian prior to initiating therapy and publication of the case report. The study adhered to ethical principles for human research, including the Declaration of Helsinki and local regulations for patient confidentiality and privacy (Gagnier et al., 2013).

3. Results and Discussion

3.1. Clinical Course and Treatment Response

The 13-year-old male patient presented with acute gastroenteritis characterized by frequent diarrhea (>10 episodes/day), recurrent vomiting, abdominal pain, fever, and general weakness. Initial assessment indicated mild-to-moderate dehydration with vital signs of blood pressure 100/70 mmHg, pulse 85 bpm, respiratory rate 20/min, and temperature 36.7°C. Laboratory examination revealed mild leukopenia (4,100/µL), suggesting a likely viral etiology (Leonard Sumadi Jap, 2021).

On the first day, treatment included intravenous rehydration using Ringer's Lactate (500 mL loading dose, followed by continuous infusion at 25 drops/min), along with oral rehydration solution (ORS), paracetamol, antacids, attapulgite, and ondansetron to control vomiting and fever. This approach aligns with WHO recommendations for managing moderate dehydration and persistent vomiting in pediatric AGE (WHO, 2024; WHO, 2005).

By the second day, the patient continued to experience diarrhea and mild vomiting, with vital signs slightly fluctuating (BP 99/67 mmHg; pulse 81 bpm; temperature 38.2°C). Additional pharmacologic interventions, including ranitidine and cotrimazole suppositories, were introduced to manage persistent gastrointestinal symptoms. Continued IV fluid therapy and oral hydration maintained hemodynamic stability and corrected fluid-electrolyte imbalance (Freedman et al., 2011; Tomasik et al., 2016).

Throughout the treatment period, the patient exhibited gradual improvement. By daytime on the second day, diarrhea frequency reduced, vomiting ceased, and fever subsided. Night evaluations showed a single episode of diarrhea, no vomiting, and mild abdominal discomfort. On the third day, the patient was asymptomatic with stable vital signs (BP 100/65 mmHg; pulse 80 bpm; temperature 36.5°C), indicating full recovery and readiness for discharge (MacDonald & McCormack, 2020; Guarino et al., 2018).

3.2. Holistic and Evidence-Based Management

This case demonstrates the effectiveness of a hydration-centered, stepwise approach combined with selective pharmacologic therapy. Intravenous rehydration served as the primary intervention to restore fluid balance, while ondansetron effectively controlled persistent vomiting, facilitating oral intake and reducing the need for prolonged IV therapy (Fugetto et al., 2020; Nino-Serna et al., 2020). Symptomatic treatments, including paracetamol, antacids, and attapulgite, addressed discomfort and enhanced patient tolerance to oral intake.

Laboratory findings, including mild leukopenia and normal hematocrit, supported a viral etiology, indicating that antibiotic therapy was not routinely necessary. This approach reflects rational antibiotic stewardship and aligns with international guidelines discouraging unnecessary antibiotic use in non-bacterial AGE (UK, 2009; Efunshile et al., 2019).

Family involvement and patient education were integral to non-pharmacological management. Guidance on hydration, dietary intake, and monitoring of symptoms facilitated adherence to treatment and early recognition of complications. This holistic approach ensured functional recovery, allowing the patient to resume daily activities without residual weakness or gastrointestinal discomfort (Farthing et al., 2013; Porter et al., 2020).

3.3. Clinical Implications

The case highlights several key considerations for primary care practice:

- Early and accurate assessment of dehydration is crucial in adolescents with AGE, as delayed recognition can lead to severe fluid and electrolyte disturbances.
- Stepwise hydration strategies, combining oral and intravenous routes, optimize recovery in patients with persistent vomiting or moderate dehydration.
- Selective use of pharmacologic interventions, particularly ondansetron, can significantly improve tolerance to oral fluids and accelerate clinical improvement.
- Rational antibiotic stewardship should be emphasized, as most pediatric AGE cases are viral. Misuse of antibiotics contributes to antimicrobial resistance and does not alter recovery in non-bacterial cases.
- Holistic care, including family involvement and patient education, enhances treatment adherence and functional recovery.

Overall, the observed rapid recovery within three days underscores that evidence-based, individualized management in a primary care setting can achieve optimal outcomes even in resource-limited environments.

4. Conclusions

The management of acute gastroenteritis in this 13-year-old patient demonstrates that a hydration-centered approach, when combined with selective pharmacologic interventions and holistic supportive care, can achieve rapid and effective clinical recovery. The integration of intravenous rehydration using Ringer's Lactate, oral rehydration therapy, and adjunctive antiemetic treatment successfully addressed the significant fluid and electrolyte losses, resulting in the normalization of vital signs and cessation of diarrhea and vomiting within three days. The patient's laboratory results, showing mild leukopenia, indicated a likely viral etiology, supporting the avoidance of unnecessary antibiotic therapy and aligning with principles of rational pharmacologic use. This case emphasizes the critical importance of early and accurate assessment of dehydration, continuous monitoring of fluid balance, and tailored therapeutic adjustments according to the patient's evolving clinical status. The stepwise intervention strategy beginning with initial stabilization through intravenous fluids, followed by oral rehydration and selective administration of antiemetics, antacids, and supportive medications—demonstrated that individualized care can optimize recovery while minimizing complications. The involvement of the patient's family in monitoring fluid intake, observing symptom progression, and reinforcing dietary and hygiene education further contributed to the successful outcome, highlighting the role of family-centered care in primary health settings. Moreover, this case underscores that guideline-based management protocols for pediatric AGE can be effectively implemented in primary care environments, even when access to extensive diagnostic resources is limited. By emphasizing hydration restoration, symptom-directed pharmacologic interventions, and proactive education, clinicians can ensure safe, efficient, and patient-centered treatment. In practice, primary care providers are encouraged to adopt a dynamic, symptom-guided management model that prioritizes hydration, judicious use of medications, and holistic support, including caregiver engagement and education. This approach not only facilitates rapid clinical stabilization but also promotes functional recovery, minimizes unnecessary escalation of care, and reduces the risk of complications. Ultimately, this case reinforces that comprehensive, individualized, and evidence-based interventions remain the cornerstone of effective management for pediatric acute gastroenteritis in community health settings.

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Informed Consent Statement: Written informed consent has been obtained from the patient's guardian to publish this case report, including clinical details and images.

Data Availability Statement: All data supporting the findings of this study are contained within the article. No additional datasets were generated or analyzed.

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