

ACUTE DIARRHEA IN CHILDREN OF EMIGRANTS DURING SUMMER VISITS TO THE COUNTRY OF ORIGIN: A CLINICAL, ETIOLOGICAL AND THERAPEUTIC ANALYSIS OF 24 PEDIATRIC CASES (MAY–OCTOBER 2025)

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Abstract

Background. Acute diarrhea remains one of the most frequent causes of pediatric presentation during the warm months, and children of emigrant families returning to their country of origin constitute a particularly high-risk subgroup (pediatric VFR — visiting friends and relatives). Abrupt changes in dietary regimen and water quality, variable hygienic-sanitary conditions and exposure to local enteric pathogens markedly increase the incidence of infectious gastroenteritis in this population.

Aim. To analyze the etiological factors, clinical manifestations, laboratory and imaging findings, treatment delivered and clinical course of acute diarrhea in children of emigrants who presented during the summer season, and to identify modifiable predisposing factors.

Materials and methods. A retrospective descriptive study was carried out on 24 children aged 2–16 years (14 girls, 10 boys) treated for acute diarrhea between May and October 2025. Demographic data, exposure history, laboratory work-up (complete blood count, CRP, electrolytes, stool culture, parasitological examination), imaging findings (abdominal ultrasound, plain abdominal radiography), treatment and clinical course were analyzed.

Results. Infectious etiology predominated: viral gastroenteritis 41.7%, bacterial infection 29.2%, foodborne intoxication 16.7%, intestinal parasitosis 8.3%. The most frequent bacterial pathogens were *Salmonella* spp., enteropathogenic *Escherichia coli* and *Campylobacter jejuni*. Dominant symptoms were watery diarrhea (100%), abdominal pain (79.2%) and vomiting (62.5%). Mild-to-moderate dehydration was documented in 37.5% of cases. Eighteen patients (75%) were managed on an outpatient basis; 6 (25%) required short-term hospitalization (mean 2.3 days). No serious complications occurred.

Conclusion. Diarrhea in children of emigrants during summer visits is mostly of infectious origin transmitted via the fecal-oral route and is closely related to dietary exposures in uncontrolled household settings. Pre-travel counseling, food and water hygiene and early oral rehydration are the cornerstones of prevention and treatment.

Keywords: acute diarrhea, children of emigrants, VFR, gastroenteritis, rehydration, *Salmonella*, Rotavirus, Norovirus, food hygiene.

Introduction

Acute pediatric diarrhea continues to be one of the leading causes of morbidity and emergency consultations worldwide, particularly during the summer months, when high ambient temperatures, easier spoilage of food and increased population mobility together create favorable conditions for the fecal-oral transmission of enteric pathogens. Although mortality has fallen substantially in middle- and high-income countries, diarrhea still represents a considerable burden in terms of outpatient visits, pediatric hospitalizations and healthcare expenditure.

Within the pediatric population, children of emigrant families who travel periodically to their country of origin to visit relatives and friends — referred to in the international literature as “pediatric VFR travelers” (Visiting Friends and Relatives) — represent an epidemiologically distinct subgroup with elevated risk of travel-associated infectious diseases (Hagmann et al., 2010; CDC, 2024). Unlike conventional tourists, these children stay for prolonged periods in rural or family settings, eat and drink in domestic environments outside standard hygienic

control, rarely attend pre-travel consultations and have lower coverage with vaccines recommended for the destination risk profile (Han et al., 2012; Bui et al., 2015).

Traveler's diarrhea (TD) is reported as the most frequent health problem among these children, with rates ranging from 13.5% to 39% of pediatric trips, depending on destination, length of stay and age (Stauffer et al., 2002; Mattila et al., 2013). Young children, especially those under five, are particularly vulnerable due to smaller fluid and electrolyte reserves, a proportionally larger weight share of gastrointestinal losses and the inability to communicate symptoms early (Guarino et al., 2014). VFR children born outside their parents' country of origin lack natural immunity to local pathogens, which makes them as — or sometimes more — susceptible than their accompanying adults (CDC, 2024).

The etiological spectrum of summer diarrhea is predominantly infectious. Enteric viruses, mainly Rotavirus and Norovirus, remain the leading agents of acute pediatric gastroenteritis throughout Europe, although the introduction of anti-rotavirus vaccination in some countries has modified the epidemiological picture (Payne et al., 2013; Yang et al., 2022). Among bacterial pathogens, enteropathogenic / enterotoxigenic *E. coli*, non-typhoidal *Salmonella* spp., *Campylobacter jejuni* and *Shigella* spp. account for the most frequent causes, while parasites such as *Giardia lamblia* and *Cryptosporidium* remain relevant in rural settings where water supply is uncontrolled (Sakran et al., 2020; Fischer Walker et al., 2012; Diallo et al., 2008). VFR children have also been shown to face an increased risk of typhoid fever and hepatitis A, underscoring the need for vaccination-status review prior to departure (Angell & Cetron, 2005; CDC, 2024).

In the specific context of the Balkans and South-Eastern Europe — the region of origin of many emigrant families now living in Western Europe, Scandinavia, North America and Australia — the seasonal summer return is regularly associated with the consumption of traditional dishes prepared at home, unpasteurized dairy products, grilled meat at family picnics, and drinking water of variable quality. This clinical reality is well known to local pediatricians but remains insufficiently documented in the domestic scientific literature. The present study aims to contribute to filling this gap.

Aim of the study

The primary aim of this study was to describe the clinical, etiological and therapeutic characteristics of acute diarrhea in children of emigrants seen at the pediatric service during the 2025 summer season.

Specific objectives were:

- to identify the most frequent etiological factors (viral, bacterial, parasitic, alimentary);
- to analyze clinical manifestations and signs of dehydration in relation to etiology;
- to evaluate the role of laboratory and imaging investigations (abdominal ultrasound and plain radiography) in diagnostic management;
- to analyze therapeutic management — with emphasis on rehydration and selective antibiotic use — and clinical course;
- to identify modifiable predisposing factors that may serve as targets for preventive intervention before travel and during the stay in the country of origin.

Materials and methods

3.1. Study design and population: The study was designed as a retrospective descriptive analysis of clinical data from cases of acute pediatric diarrhea presenting at the pediatric service between 1 May and 31 October 2025. Twenty-four children aged 2–16 years (14 girls, 58.3%; 10 boys, 41.7%) were included, all with a history of long-term residence abroad (primary

residence in a Western European country) and seasonal return to the country of origin during the summer months.

3.2. Inclusion and exclusion criteria: Inclusion criteria were: age 2–16 years; an acute episode of diarrhea (≥ 3 loose stools within 24 hours) starting within 7 days of arrival in the country of origin; residence abroad for ≥ 6 months prior to the current episode; complete clinical documentation.

Children with chronic gastrointestinal disease (inflammatory bowel disease, celiac disease), patients with primary or secondary immunodeficiency, those with chronic metabolic disease, and cases with incomplete documentation were excluded.

3.3. Data collected and diagnostic procedures: For each patient the following were recorded: age, sex, length of stay abroad, time interval between arrival and onset of symptoms, suspected dietary exposures (water, food, setting of consumption), clinical symptoms, physical examination findings, grading of dehydration (mild / moderate / severe according to clinical criteria), laboratory parameters (complete blood count, CRP, serum electrolytes, urea, creatinine), stool culture and parasitological stool examination. Abdominal ultrasound was performed in cases with marked abdominal pain or suspicion of additional pathology; plain abdominal radiography was performed when clinically indicated.

3.4. Ethical considerations and analysis; Data were collected anonymously from clinical records, in accordance with the principles of the Declaration of Helsinki. Analysis is descriptive, with results expressed as absolute numbers and percentages, mean values and age range.

Results

4.1. Demographic characteristics: Of the 24 patients enrolled, 14 were girls (58.3%) and 10 were boys (41.7%). Mean age was 8.4 years (range 2–16 years). The age-group distribution is shown in Table 1. The largest concentration was in the 6–10-year age group (37.5%), followed by the preschool group of 2–5 years (33.3%).

Table 1. Distribution of patients by age group (n = 24)

Age group	Number of patients	Percentage (%)
2–5 years	8	33.3
6–10 years	9	37.5
11–16 years	7	29.2
Total	24	100

4.2. Etiological factors: Infectious etiology accounted for the predominant cause (87.5% of cases). The distribution of identified causes is shown in Table 2.

Table 2. Etiological factors of acute diarrhea (n = 24)

Etiological factor	Number of cases	Percentage (%)
Viral gastroenteritis (Rotavirus, Norovirus)	10	41.7
Bacterial infection (Salmonella spp., E. coli, Campylobacter jejuni)	7	29.2
Foodborne intoxication	4	16.7
Intestinal parasitosis (Giardia lamblia)	2	8.3
Undetermined	1	4.1
Total	24	100

Among viral infections, the clinical picture most often suggested Rotavirus and Norovirus as the likely agents. Among bacterial infections, stool culture isolated *Salmonella* spp. in 3 cases, enteropathogenic *Escherichia coli* in 2 cases and *Campylobacter jejuni* in 2 cases. Parasitological examination identified *Giardia lamblia* in 2 patients with subacute–persistent diarrhea.

4.3. Predisposing factors: The dietary history most often revealed: consumption of unfiltered water from family wells or private boreholes; meat or unpasteurized dairy products; ice cream or food bought in open-air settings; and consumption of traditional dishes (savory pastries, meat dishes, salads) prepared at home and kept for several hours at ambient temperature during family gatherings. In 15 cases (62.5%) consumption of food prepared ≥ 3 hours before being eaten, without adequate refrigeration, was documented. Sixteen families (66.7%) reported that they had not consulted a pediatrician before departure for advice on food hygiene and vaccination status.

4.4. Clinical manifestations: Symptoms began on average 24–72 hours after arrival in the country of origin. Watery diarrhea was present in all patients; abdominal pain — predominantly periumbilical and in the lower quadrants — was reported by 79.2%; vomiting by 62.5% and fever $>38^{\circ}\text{C}$ by 54.2% (Table 3). In patients with bacterial etiology, fever was more pronounced and diarrhea was more often associated with mucus or blood.

Table 3. Clinical manifestations reported by the patients (n = 24)

Symptom / sign	Number of cases	Percentage (%)
Watery diarrhea	24	100
Abdominal pain	19	79.2
Vomiting	15	62.5
Fever ($>38^{\circ}\text{C}$)	13	54.2
Loss of appetite	12	50.0

Symptom / sign	Number of cases	Percentage (%)
Mild–moderate dehydration	9	37.5
Asthenia (general weakness)	8	33.3
Diarrhea with mucus	5	20.8
Bloody diarrhea	2	8.3

4.5. Laboratory and imaging findings: The complete blood count showed leukocytosis in 9 patients (37.5%), with neutrophil predominance in bacterial cases and relative lymphocytosis in viral cases. CRP was elevated (>20 mg/L) in 11 patients (45.8%). The most frequent electrolyte disturbances were mild hyponatremia and hypokalemia, mainly in patients with repeated vomiting.

Abdominal ultrasound was performed in 8 patients (33.3%) because of marked abdominal pain or suspicion of additional pathology. The most common findings were intestinal meteorism, mesenteric lymphadenitis and mild thickening of the bowel wall; no case revealed pathology requiring surgical intervention. Plain abdominal radiography was performed in 5 patients and showed intestinal distension with minimal air-fluid levels and no signs of obstruction.

4.6. Treatment and clinical course: Oral rehydration with hypo-osmolar solutions was the mainstay of treatment in most cases, in accordance with the ESPGHAN/ESPID guidelines (Guarino et al., 2014). In 6 patients (25%) with oral intolerance or moderate dehydration, intravenous rehydration with normal saline and Ringer's lactate was administered, with careful electrolyte correction. Symptomatic therapy included antipyretics (paracetamol), probiotics (*Saccharomyces boulardii* and *Lactobacillus rhamnosus* GG) and ondansetron in patients with repeated vomiting. Refeeding was resumed within 4–6 hours of rehydration, in accordance with current recommendations.

Antibiotic therapy was used selectively in 7 patients (29.2%) with suspected or confirmed invasive bacterial infection. Regimens included azithromycin (first-choice agent for suspected *Campylobacter* or *Shigella*), parenteral ceftriaxone in febrile patients with a more severe course, and trimethoprim/sulfamethoxazole in selected cases. Both children with *Giardia lamblia* received oral metronidazole for 7 days.

Eighteen patients (75%) were managed as outpatients; 6 patients (25%) required short-term hospitalization with a mean length of stay of 2.3 days. Mean duration of symptoms was 3–5 days. No patient developed serious complications (sepsis, acute renal failure, intestinal obstruction, severe dehydration) and none required intensive-care treatment. All patients recovered fully.

Discussion

Our study confirms that acute diarrhea among children of emigrants during summer visits to their country of origin is mostly of infectious etiology and presents with a clinical profile consistent with the international literature on pediatric traveler's diarrhea (Shah et al., 2009; Mattila et al., 2013). The predominance of viral gastroenteritis (41.7%), followed by bacterial causes (29.2%), reproduces the distribution reported in European and Asian studies of the past decade (Payne et al., 2013; Yang et al., 2022; Gastañaduy et al., 2013).

Rotavirus and Norovirus remain the two most frequent agents of pediatric gastroenteritis. Although rotavirus vaccination has substantially reduced its relative weight in developed countries, VFR children often have an incomplete vaccination schedule or are vaccinated late in the host country; the result is a vulnerable population travelling to destinations with active viral circulation (Han et al., 2012; Bui et al., 2015). In many developed settings Norovirus has become the leading agent following anti-rotavirus vaccination, and is characterized by prolonged fecal viral shedding that promotes secondary household transmission (Payne et al., 2013).

Among bacterial pathogens, the isolation of non-typhoidal *Salmonella* spp., enteropathogenic *E. coli* and *Campylobacter jejuni* is consistent with data reported from the Mediterranean region and the Middle East, where these organisms represent the leading causes of pediatric bacterial enteritis during the warm months (Sakran et al., 2020; Diallo et al., 2008). The seasonality of non-typhoidal salmonellosis, with a clear peak between May and September, is well documented in the literature and is linked to increased consumption of eggs, poultry and dairy products stored under suboptimal conditions (Cheng et al., 2019). The identification of *Giardia lamblia* in two of our cases is a reminder that intestinal parasitoses must be considered, particularly in subacute or persistent diarrhea, when conventional stool culture is negative (Fischer Walker et al., 2012).

An important finding of our study is the marked impact of behavioral and dietary factors: 62.5% of patients reported eating food kept at room temperature for several hours, and 66.7% of families had not received pre-travel counseling. This is consistent with the literature documenting that VFR families are the group least covered by pre-travel services (Hagmann et al., 2010; Han et al., 2012). The reasons are complex and include: the misperception that returning “home” poses no health risk, language and economic barriers, the lack of specialized travel-medicine consultations, and prolonged stays in rural conditions (CDC, 2024).

Despite clinical similarities, VFR children may be at higher risk than tourist children for several documented reasons: longer exposure (2–6 weeks rather than a few days), accommodation in family homes in rural areas with limited hygienic-sanitary infrastructure, direct consumption of non-commercial food and water, and close contact with the local population (CDC, 2024; Angell & Cetron, 2005). As a consequence, beyond classical gastroenteritis they also face an elevated risk of typhoid fever, hepatitis A, malaria (in endemic destinations) and tuberculosis — a consideration that should be reflected in pre-travel care plans (Han et al., 2012).

The treatment applied in our series followed the current ESPGHAN/ESPID 2014 guidelines, which recommend oral rehydration with hypo-osmolar solutions as first-line therapy and reserve the intravenous route for cases with severe dehydration or oral intolerance (Guarino et al., 2014). Adjunctive interventions — selective probiotics (*Lactobacillus rhamnosus* GG, *Saccharomyces boulardii*) and ondansetron for vomiting — have solid support in clinical trials and have been shown to reduce both the duration of diarrhea and the need for hospitalization (Szajewska et al., 2014; Freedman et al., 2014).

Antibiotic therapy in acute pediatric diarrhea remains an area of narrow consensus: it is recommended only in cases of suspected or confirmed invasive infection (dysenteric diarrhea with high fever, systemic toxicity, risk factors) or for specific pathogens (*Shigella*, *Campylobacter* in protracted diarrhea, *Salmonella* in infants <3 months or immunocompromised patients). Azithromycin is gaining ground as the preferred empirical agent because of rising *Campylobacter* resistance to fluoroquinolones and its good safety profile in children (Riddle et al., 2017; CDC, 2024). We used antibiotics in 29.2% of cases, a proportion in line with the series reported by Sakran et al. (2020) in children hospitalized for bacterial gastroenteritis.

Stronger collaboration between the host-country pediatrician and the pediatrician in the country of origin is essential. Pre-departure counseling should include: review of vaccination status

(including rotavirus, hepatitis A and typhoid fever where indicated), education on hand and water hygiene, preparation of a “travel kit” containing oral rehydration solution (ORS) and paracetamol, and a simple algorithm for parents indicating when to seek medical care (high fever, blood in stool, marked dehydration, symptoms lasting >72 hours) (Stauffer et al., 2002; CDC, 2024).

Limitations of this study include the relatively small sample size ($n = 24$), its retrospective and single-center character, the absence of advanced molecular testing (multiplex PCR) for the identification of viral pathogens, and the inability to follow patients after they had left the country of origin. Nevertheless, the results provide a useful clinical overview and serve as a basis for further prospective studies with larger samples and molecular diagnostics.

Conclusion

Acute diarrhea in children of emigrants during summer visits to their country of origin is overwhelmingly of infectious origin, with a predominance of viral (Rotavirus, Norovirus) and bacterial (*Salmonella*, *E. coli*, *Campylobacter*) gastroenteritis. Modifiable dietary and hygienic factors — unfiltered water, food kept at unsuitable temperatures, lack of pre-travel counseling — play a decisive role in the pathogenesis of these cases.

Clinical course is predominantly benign when diagnosis is established early and oral rehydration is started promptly. The limited and well-targeted use of antibiotics, combined with symptomatic treatment and selective probiotics, constitutes an effective therapeutic strategy.

We recommend: (i) systematic education of emigrant families before departure on food hygiene, vaccination and the “travel kit” including ORS; (ii) closer collaboration between the host-country pediatrician and the pediatrician in the country of origin; (iii) expansion of molecular diagnostics in local pediatric centers for better etiological characterization; and (iv) prospective studies with larger samples that would allow the formulation of clinical guidelines specific to this population, which has distinct epidemiological features.

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