

The aetiology of acute gastroenteritis in children in Malta and the use of empirical antibiotics in its management

Sarah Anne Caruana Galizia, Cecil Vella

BACKGROUND

Rotavirus is the leading cause of gastroenteritis in Europe. No specific clinical feature differentiates bacterial from viral gastroenteritis. Acute gastroenteritis self-resolves without antibiotics in the majority of healthy children regardless of the aetiology. Empirical antibiotics should only be prescribed for specific indications, as stated in the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) / European Society for Pediatrics Infectious Diseases (ESPID) Evidence – Based Guidelines for the Management of Acute Gastroenteritis in Children in Europe. This audit aimed to assess the prevalence of the different pathogens causing acute gastroenteritis in children in Malta and to establish whether empirical antibiotics are being prescribed according to the aforementioned guidelines.

METHOD

All children admitted to Mater Dei Hospital between 1st September 2019 and 29th February 2020 with acute gastroenteritis were included. The data was collected retrospectively from iSOFT Clinical Manager and medical records. The results were compared to the aforementioned guidelines.

RESULTS

Rotavirus was the most commonly identified pathogen accounting for 37.9% of all cases. Non-typhoid *Salmonella* was the commonest bacterial cause. Empirical antibiotics were prescribed in 20.3% of all cases but were indicated in just 8.4%. Furthermore, empirical antibiotics were only indicated in 37.9% of the patients who received them. The commonest indicator was severe toxemia.

CONCLUSION

Acute gastroenteritis in children in Malta is mainly viral, *Rotavirus* being the most common pathogen. There is significant over-prescription of empirical antibiotics in acute gastroenteritis. Measures need to be introduced to reduce antibiotic overuse and its risks.

Sarah Anne Caruana Galizia* MD
MRCPCH (UK)
Higher Specialist Trainee in Paediatrics
Department of Paediatrics
Mater Dei Hospital
Msida, Malta
sarah.caruana-galizia@gov.mt

Cecil Vella MD MRCP(UK) FRCPCH
Consultant Paediatrician
Department of Paediatrics
Mater Dei Hospital
Msida, Malta

*Corresponding author

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INTRODUCTION

Acute gastroenteritis is a major reason for hospitalisation in paediatric patients both locally and abroad, and the incidence of diarrhoea in Europe in children aged less than 3 years is 0.5 to 2 episodes per child per year. In a retrospective age-stratified cross-sectional study carried out in Malta in 2007 by Gauci. C. et al, the observed standardized monthly prevalence of infectious intestinal disease was 3.18% with 0.421 episodes of infectious diarrhoea per person per year. The greatest prevalence was found in the < 5 year age group.¹

Rotavirus is the most common cause of acute gastroenteritis in children in all European countries. However, *Norovirus* is fast becoming a leading cause of gastroenteritis in countries which have a high rotavirus vaccine coverage and is currently the cause for hospitalisation in 10 – 15% of paediatric patients admitted to hospital with acute gastroenteritis in Europe. The most common bacterial agent causing acute gastroenteritis is either *Campylobacter* or *Salmonella* depending on the country.

There is no specific clinical feature that can differentiate a bacterial from a viral cause for acute

gastroenteritis. However, a high fever (> 40°C), overt faecal blood, accompanying abdominal pain and febrile seizures are each suggestive of a bacterial pathogen. Vomiting and respiratory symptoms are associated with viral gastroenteritis.

Acute gastroenteritis in a child without any significant underlying disease is usually self-limiting regardless of whether the aetiology is viral or bacterial. In the vast majority of cases clinical recovery occurs within a few days and the causative microbe is cleared within a few days or weeks without any specific antimicrobial therapy. Complications are rare.

Antibiotic therapy should hence not be given routinely for acute bacterial gastroenteritis, and is only recommended for specific pathogens and in specific clinical settings. The aetiology of sporadic acute gastroenteritis is usually not known at the onset of symptoms. According to the ESPGHAN / ESPID Evidence – Based Guidelines for the Management of Acute Gastroenteritis in Children in Europe (updated in 2014), empirical antibiotics for acute gastroenteritis should only be prescribed when specific indicators are present, as shown in Table 1.²

Table 1 Indicators for Empirical Antibiotic Therapy in Acute Gastroenteritis according to the ESPGHAN/ESPID Guidelines.

Indicators for Empirical Antibiotic Therapy in Acute Gastroenteritis
Patients with underlying immunodeficiency who have acute gastroenteritis with fever
Severe toxemia / suspected or confirmed bacteraemia
Neonates and infants aged < 3 months with fever (following sepsis work-up)
Invasive / inflammatory diarrhoea - acute onset of bloody/mucous diarrhoea with high fever (> 38.5°C)
Non-invasive (watery) diarrhoea in a patient who has recently travelled or who may have been exposed to cholera
Bloody diarrhoea with no/low fever if shigellosis is suspected or confirmed

The primary aim of this audit was to assess the prevalence of the different causative viral and bacterial pathogens in paediatric patients requiring admission to Mater Dei Hospital with acute gastroenteritis. The secondary aim was to assess whether empirical antibiotics were prescribed according to the recommendations of the ESPGHAN / ESPID guidelines in these patients.

MATERIALS AND METHODS

Approval for the audit was obtained from the Data Protection Act Committee. All patients up to the age of 16 years admitted to the paediatric wards at Mater Dei Hospital with acute gastroenteritis, over a six - month period between 1st September 2019 up to 29th February 2020, were included in this audit.

The data was collected retrospectively from iSOFT Clinical Manager and the patients' medical records and the results were compared to the aforementioned ESPGHAN / ESPID Guidelines.

For the purpose of this audit, a diagnosis of acute gastroenteritis was defined as a decrease in the consistency of the stools to loose or liquid and / or an increase in the frequency of evacuations (3 or more in 24 hours) with or without fever or vomiting, lasting less than 7 days and not more than 14 days.

Patients were only included in this audit if they fitted the aforementioned definition of acute gastroenteritis. Those already started on empirical antibiotics by their general practitioner were included in the data collection. Patients admitted directly to the Neonatal and Paediatric Intensive Care Unit from Accident and Emergency were excluded from the audit.

Stool Polymerase Chain Reaction (PCR), stool culture and respiratory screen results were used to identify the causative organisms. At Mater Dei Hospital, stool cultures are only processed if an

organism is detected on stool PCR testing. A respiratory screen is a swab taken from the nasal mucosa which allows detection of the most common respiratory pathogens, some of which may also cause acute gastroenteritis, by means of PCR testing.

RESULTS

Out of a total of 143 patients with a documented diagnosis of acute gastroenteritis, samples for stool PCR, with or without cultures, were only obtained in 95 patients (66.4%). A respiratory screen was only taken in 37 patients (25.9%), and a proportion of these also had a stool PCR and / or culture result. From these samples, the aetiological organism was only confirmed in 66 cases (46.2%). Out of these 66 cases, 48 (72.7%) were confirmed to be of viral aetiology on stool PCR, cultures and / or respiratory screen, whilst 18 (27.3%) were confirmed to be bacterial. No cause could be ascertained in 77 cases (53.8% of the study cohort) and, of those, 76 were clinically viral and 1 case was clinically bacterial in nature. When considering those cases where the aetiology was confirmed both by investigations and the clinical picture, 124 patients (86.7% of the total cohort) had viral gastroenteritis and 19 patients (13.3%) had bacterial gastroenteritis.

Overall, *Rotavirus* was the most commonly identified organism, accounting for 37.9% of all cases in which the aetiological organism was confirmed by investigations, and 52.1% out of all confirmed viral cases. Non-typhoid *Salmonella* was the second most commonly identified organism, accounting for 16.7% of cases in which the organism was confirmed.

Respiratory Syncytial Virus (RSV) and *Adenovirus* were the next most frequently identified viral causes after *Rotavirus*. *Salmonella* was the most commonly identified bacterial cause, accounting for

61.1% of bacterial cases, whilst *Campylobacter* accounted for the rest of the bacterial cases (38.9%) (Refer to Table 2).

Empirical antibiotics were prescribed in 29 out of 143 cases (20.3%), yet according to the guidelines, antibiotics were only indicated in 12 cases (8.4%). Furthermore, empirical antibiotics were only indicated in 11 (37.9%) out of the 29 patients who

received them. There was only 1 case in which empirical antibiotics were indicated but were not prescribed.

The most common indicators for prescribing empirical antibiotics are shown in Table 3. None of the patients had any of the other indicators shown in Table 1.

Table 2 The viral and bacterial pathogens identified by investigations as the aetiology of acute gastroenteritis shown in order of their frequency.

Aetiology	Pathogen	Number of Isolates	Percentage of Total Isolates
Viral	<i>Rotavirus</i>	25	37.9%
	<i>Respiratory Syncytial Virus</i>	8	12.1%
	<i>Adenovirus</i>	7	10.6%
	<i>Enterovirus</i>	3	4.5%
	<i>Human Coronavirus OC43</i>	1	1.5%
	<i>Human Parainfluenza Virus 1</i>	1	1.5%
	<i>Norovirus</i>	0	0%
	≥ 2 viral pathogens identified	3	4.5%
Bacterial	<i>Salmonella</i>	11	16.7%
	<i>Campylobacter</i>	7	10.6%
	<i>Escherichia coli</i>	0	0%
	<i>Shigella</i>	0	0%
	<i>Vibrio cholerae</i>	0	0%
Total Number of Isolates		66	100%