

## A Review of Acute Gastroenteritis in Hospitalized Pediatric Patients from 2012 to 2016 in Centro Hospitalar Conde de São Januário

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### Abstract

Acute gastroenteritis is a problem commonly seen in pediatrics. This review is to analyze the hospitalized pediatric patients in recent 5 years due to acute gastroenteritis in Centro Hospitalar Conde de São Januário. One hundred and sixty three pediatric patients admitted with ICD codes 001-009, 558.9 and 787 in CHCSJ from 2012 to 2016 were obtained. Their age, gender, causal organisms, symptoms, seasonal changes, the trend and prognosis were analyzed. The statistics were analyzed by using the Pearson test.

It is found that the younger age group was more easily affected, as they were more susceptible to dehydration. The median age was 1.25 years old. More male patients were affected than female patients. The female to male ratio was 1:1.4. Sixty per cent of the admitted patients had pathogens detected. Viral infection had the biggest composition, as is seen in worldwide. The commonest virus being detected was Rotavirus. The commonest symptom of acute gastroenteritis was diarrhea, followed by fever and vomiting. Vomiting was more commonly seen in Rotaviral infection ( $p < 0.01$ ), whereas fever and bloody stool was more commonly seen in *Salmonella* infection ( $p < 0.01$  both). There were more acute gastroenteritis admissions due the autumn and winter seasons. Viral infection (rota- and novovirus) was seen more during autumn and winter seasons, whereas *Salmonella* was seen more in spring and summer seasons. The hospitalizations due to acute gastroenteritis was in a decreasing trend, especially for rotavirus. This may be due to the better nutrition status and primary health care, improved health knowledge and early intervention of patients with acute gastroenteritis. Most important of all, the reduction of Rotavirus infection is related to the introduction of oral Rotavirus vaccine.

**Keywords:** Acute Gastroenteritis; Rotavirus; Novovirus

### Introduction

Acute gastroenteritis (AGE) is a problem commonly seen in pediatrics. The overall global incidence is 2.9 episodes per child-year, and is the second most common cause of child deaths worldwide. Viruses, primarily rotavirus species, are responsible for 70 to 80 percent of infectious diarrhea cases in the developed world. Before the rota vaccine was available, a considerable number of patients were affected by rotavirus each year, with up to 15 percent of them were hospitalized, and around 1 in every 10000 patients died.

### Aims

This review is to analyze the hospitalized pediatric patients in recent 5 years due to AGE in Centro Hospitalar Conde de São Januário, Macau (CHCSJ).

### Material

Through the ICD study from HIS system, obtained 163 pediatric patients admitted with ICD codes 001-009, 558.9 and 787 in CHCSJ from 2012 to 2016.

### Method

The criteria for inclusion includes patients with clinical diagnosis of AGE: infectious gastroenteritis, non-infectious gastroenteritis, and both viral and bacterial gastroenteritis. Their age, gender, causal organisms, symptoms, seasonal changes, the trend and prognosis were analyzed. The statistics were analyzed by using the Pearson test.

### Results

**Age:** The age ranges from less than 1 month to 11 years old, and the median age was 1.25 years old.

**Gender:** The female to male ratio was 1:1.4.

**Casual organisms:** 60% of the admitted patients had pathogens detected, the commonest being Rotavirus, next comes *Salmonella*, slightly less than Rotavirus. Other pathogens were Novovirus, *Escherichia coli*, *Enterovirus* (Coxsackievirus), *Clostridium difficile*, *Campylobacter* and *Proteus mirabilis* (Figure 1).

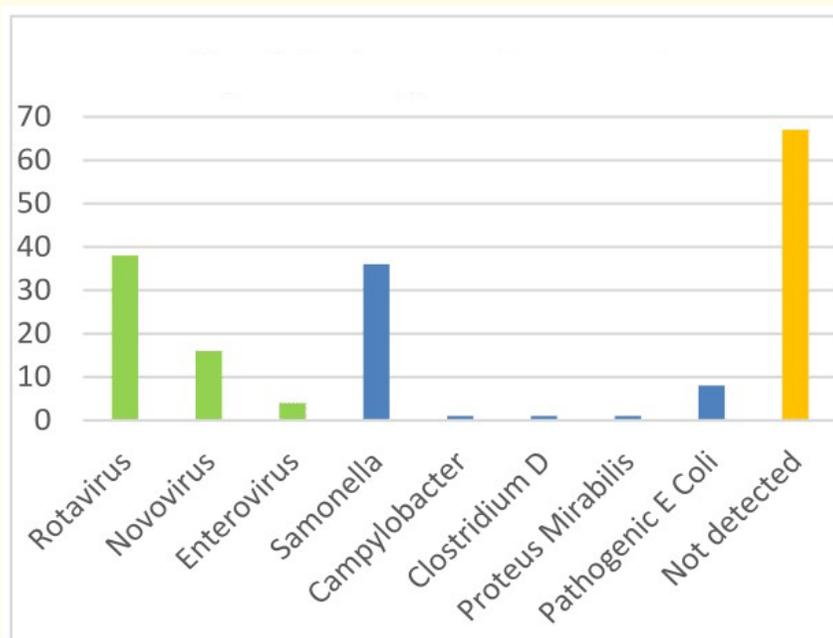


Figure 1: Pathogens detected.

**Symptoms:** The commonest symptom of AGE was diarrhea, followed by fever and vomiting (Figure 2).

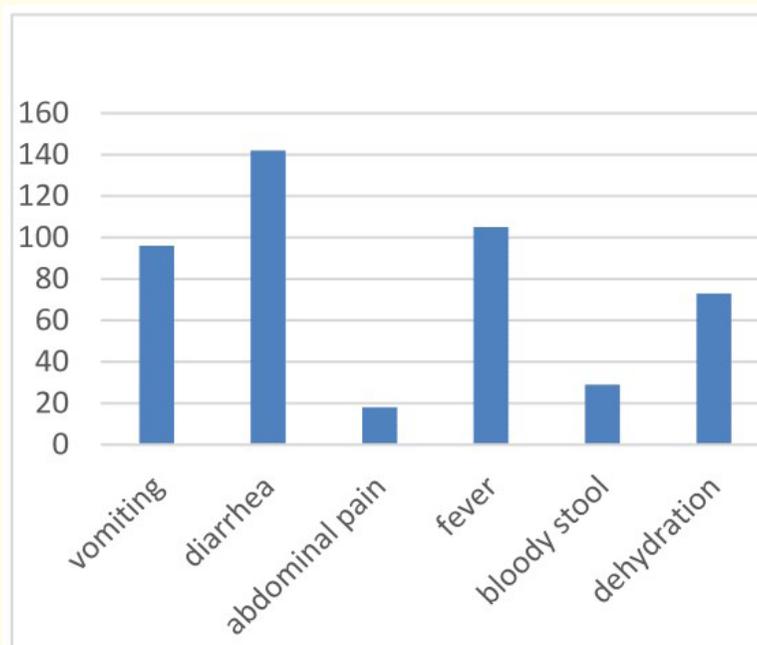


Figure 2: Common symptoms of AGE.

Vomiting was more commonly seen in Rotaviral infection ( $p < 0.01$ ), whereas fever and bloody stool was more commonly seen in *Salmonella* infection ( $p < 0.01$  both). There was no statistical meaning in dehydration and diarrhea. Abdominal pain was uncommonly complained due to the young age in most patients.

**Seasonal changes:** There are more AGE admissions due the autumn and winter seasons. Viral infection (rota- and novovirus) was seen more during autumn and winter seasons, whereas *Salmonella* was found more in spring and summer seasons (Figure 3).

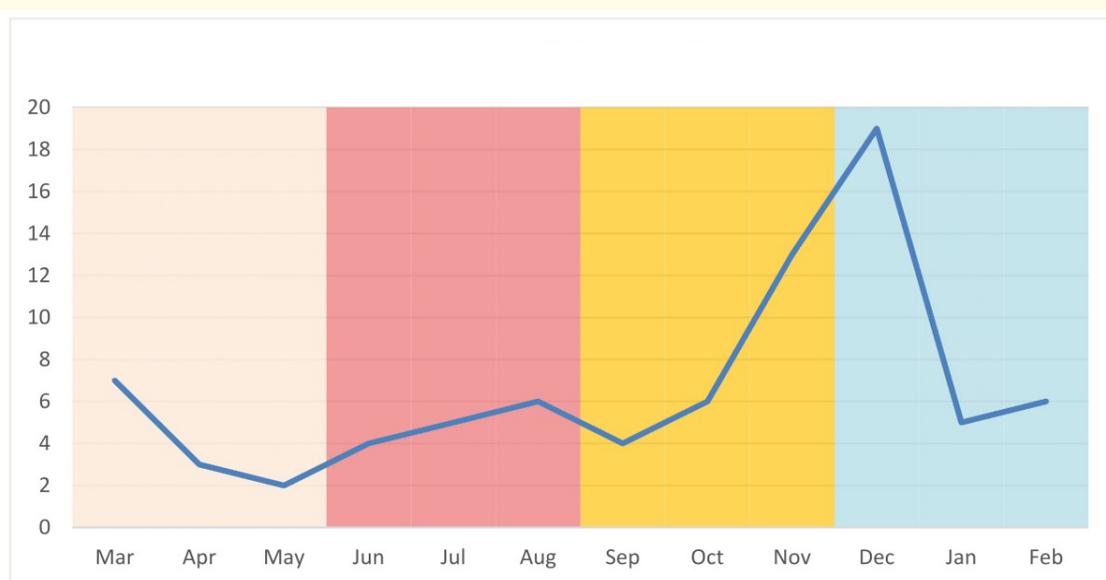
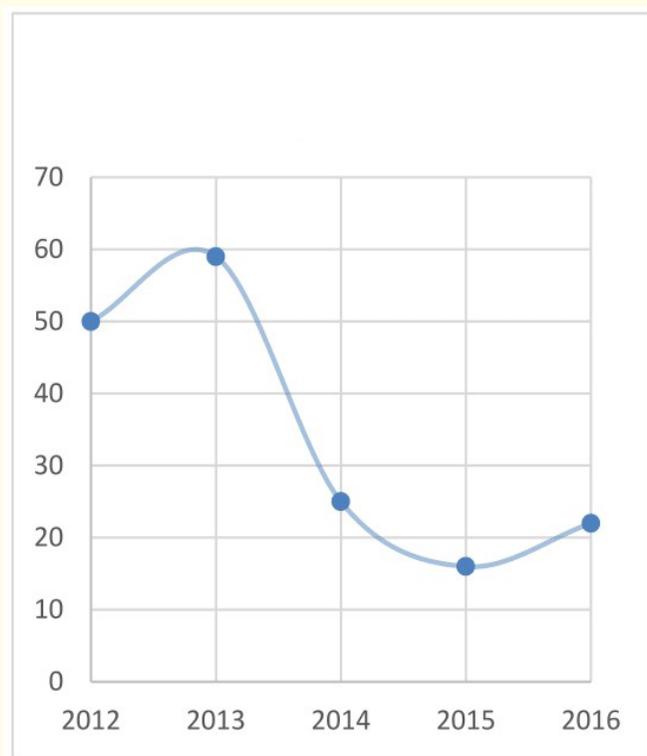


Figure 3: Seasonal changes of AGE.

**Trend:** It is seen that the trend of hospitalization in pediatric AGE is getting less, especially in Rotaviral infection (Table 1, Figure 4).

Pathogens	2012	2013	2014	2015	2016	Total
<i>Salmonella</i>	5	9	10	7	5	36
<i>Campylobacter</i>	0	0	0	0	1	1
<i>Clostridium D</i>	0	0	0	0	1	1
<i>Proteus mirabilis</i>	0	1	0	0	0	1
Pathogenic <i>E. coli</i>	3	2	2	1	0	8
Rotavirus	9	19	5	2	3	38
Novovirus	10	1	1	2	2	16
Enterovirus	2	2	0	0	0	4
Not detected	21	25	7	4	10	67
Total	50	59	25	16	22	172

**Table 1:** AGE pathogens in 5 years.



**Figure 4:** Number of AGE cases in 5 years.

**Prognosis:** We found one dead case in 5 years. That fatal case was a male patient with global developmental delay, failure to thrive and post gastrostomy with congenital anomalies since birth. The boy was infected with rotavirus, complicated with septic shock.

## **Discussion**

Viral infection is the leading cause of AGE worldwide, accounting for approximately 70% of episodes of AGE in children. Rotavirus is the commonest viral pathogen. However, since the oral Rotavirus vaccine became available first in the USA in 2006, the incidence of rotavirus infection had decreased dramatically. However, not all babies are suitable for immunization against rotavirus. Those babies with previous severe allergic effects, severe combined immunodeficiency (SCID) and intussusception history should not take the vaccine. *Salmonella* is the second commonest detected pathogens in pediatric inpatients in our study.

Male patients was more affected than female patients in our study, although AGE usually affects both gender equally. The mean age of hospitalized patients was relatively young. The reason may be due to the admission criteria for very young babies with fever. Moreover, pediatric patients of younger age is more susceptible to dehydration and always required hospitalization.

Diarrhea, vomiting and fever are the commonest symptoms of AGE in the patients. Symptoms may provide some hints to the causal organisms. Vomiting is found more in Rotavirus infection whereas fever and bloody stool is seen more in *Salmonella* infection. Dehydration can be seen in around 60% of the patients.

It is noticed that in developing countries, the admission rate is higher than developed countries. This may be due to the better nutrition status and primary care in those countries. However, Hong Kong as a developed city has a high admission rate comparing with many developing countries. This may reflect that the decision of admission does not simply depend on the clinical situations, but can also be affected by the parents' wishes or anxiety and other social factors. We found same problem in Macau. Moderate to severe dehydration, requiring intravenous fluids, was one important criterion for admission. However, dehydration was not seen in all patients, meaning that there are other criteria for hospitalization, which included very young age (less than 3mo), vomiting and intolerance to oral rehydration therapy.

The overall admission in recent years is on downtrend, especially in rotaviral infection. This may be due to improved health knowledge and early intervention of patients with AGE.

The reduction of Rotavirus infection is related to the introduction of oral Rotavirus vaccine, as is seen worldwide. There has been a dramatic decrease in the number of children who are hospitalized or visit the emergency room because of rotavirus illness [1-3].

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