

# Emergency department use of oral ondansetron for acute gastroenteritis-related vomiting in infants and children



Français en page 180

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Acute gastroenteritis is one of the most common causes of emergency room visits. Although it is usually a self-limited infection, vomiting related to this illness can cause various degrees of dehydration, leading to intravenous insertion, electrolyte abnormalities and/or hospital admission. Ondansetron is a highly potent antiemetic drug that is effective in preventing chemotherapy- and radiation-induced nausea and vomiting with a very low risk of adverse effects. Recently, ondansetron has been used to control vomiting related to acute gastroenteritis. The present article examines evidence for the use of oral ondansetron for acute gastroenteritis-related vomiting in infants and children, and provides a recommendation for treatment based on the evidence-based review.

**Key Words:** Children; Emergency; Gastroenteritis; Infants; Ondansetron; Vomiting

Acute gastroenteritis is the most common cause of physician visits and hospitalizations in infants and young children. Each year in the United States, gastroenteritis accounts for approximately two to four million physician visits (1-3). The estimated incidence of acute gastroenteritis in children younger than five years of age is approximately one to two episodes annually in industrialized countries (4). In the United States, the disease accounts for 20% of all outpatient visits among younger children, and more than 200,000 hospitalizations per year (5).

Acute gastroenteritis is the most common cause of vomiting in children, and is often associated with abdominal pain, cramping, diarrhea and fever (6). It is usually a self-limited infection, and is most commonly caused by viruses such as rotavirus or norovirus (2,6). During the course of illness, many children suffer from an inability to tolerate fluids and solids. Those with persistent vomiting are at risk of dehydration, electrolyte abnormalities and, for the more seriously affected, intravenous (IV) rehydration therapy and/or hospital admission may be necessary.

## ONDANSETRON – PHARMACOLOGY AND PATTERNS OF USE

Antiemetic drugs are frequently used to treat vomiting in infants and children with gastroenteritis. A recent survey (7)

## L'utilisation de l'ondansétron par voie orale au département d'urgence pour traiter les vomissements aigus liés à la gastroentérite chez les nourrissons et les enfants

La gastroentérite aiguë est l'une des principales causes de visites au département d'urgence. Même si c'est généralement une infection spontanément résolutive, les vomissements qui y sont liés peuvent causer divers degrés de déshydratation, entraîner une insertion intraveineuse, des anomalies électrolytiques ou une hospitalisation. L'ondansétron est un médicament antiémétique très puissant, efficace pour prévenir les nausées et les vomissements induits par la chimiothérapie et la radiothérapie et au très faible risque d'effets secondaires. Récemment, l'ondansétron a été utilisé pour contrôler les vomissements liés à la gastroentérite aiguë. Le présent article examine les données probantes étayant l'utilisation de l'ondansétron par voie orale pour traiter les vomissements aigus liés à la gastroentérite chez les nourrissons et les enfants et contient une recommandation de traitement d'après l'analyse probante.

of paediatricians, emergency physicians and paediatric emergency physicians reported that 61% of physicians had prescribed an antiemetic medication for paediatric gastroenteritis-related vomiting at least once in the previous year. Prescription patterns and use of antiemetic medications such as promethazine, metoclopramide, dimenhydrinate and domperidone vary considerably (8,9). Although rare, worrisome adverse effects such as drowsiness, extrapyramidal reactions, hallucinations, convulsions and neuroleptic malignant syndrome must be considered when prescribing these medications (8,9).

Ondansetron is a highly potent and selective serotonin 5-HT<sub>3</sub> receptor antagonist. When administered orally, it is rapidly absorbed by the gastrointestinal tract, achieving peak plasma concentrations after only 1 h to 2 h (10-13). Ondansetron is safe and effective in preventing chemotherapy- and radiation-induced nausea and vomiting, as well as vomiting in postoperative patients (14-18). When used in these clinical circumstances, there is a very low risk of significant adverse effects (14-18). When used for gastroenteritis in infants and children, the most common side effect is diarrhea, which is usually quite mild and self-limiting (13,19). Due to its favourable safety profile and absence of drowsiness as a side effect, several clinical trials have been conducted in the past 20 years to assess the efficacy of ondansetron use in paediatric gastroenteritis.

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**TABLE 1**  
**Clinical trials: Use of oral ondansetron for gastroenteritis-related vomiting in infants and children**

Study, year	Patients,		Inclusion criteria	Dose (patient weight or age)	Results after ondansetron treatment, RR (95% CI)		
	n	Age range			Persistent emesis in ED	Receiving IV fluids	Hospital admission
Freedman et al (20), 2006	215	6 mos to 10 yrs	Gastroenteritis with mild to moderate dehydration and vomiting in the preceding 4 h	2 mg (8–15 kg); 4 mg (15–30 kg); 8 mg (>30 kg)	0.40 (0.26–0.61)	0.46 (0.26–0.79)	0.80 (0.22–2.90)
Roslund et al (21), 2008	106	1 to 10 yrs	Gastroenteritis with failed oral rehydration attempt in ED	2 mg (8–15 kg); 4 mg (15–30 kg); 6 mg (>30 kg)	0.43 (0.20–0.94)	0.40 (0.20–0.79)	0.46 (0.12–1.79)
Ramsook et al (22), 2002	145	6 mos to 12 yrs	Gastroenteritis with recurrent vomiting in the preceding 24 h	1.6 mg (6 mos to 1 yr); 3.2 mg (1 to 3 yrs); 4 mg (4 to 12 yrs)	0.38 (0.18–0.80)	0.36 (0.14–0.92)	0.17 (0.04–0.78)

ED Emergency department; IV Intravenous; mos Months; yr Year

### REVIEW OF PAEDIATRIC EVIDENCE

In total, three randomized controlled studies (20–22) that examined the use of oral ondansetron for vomiting due to acute gastroenteritis were identified (Table 1). Studies that examined the use of IV ondansetron in acute gastroenteritis were not considered for the purposes of the present review (23,24). One recent meta-analysis published in 2008 (25) examined the efficacy of various antiemetics and will be discussed below.

In 2006, Freedman et al (20) published a study that enrolled 215 children six months to 10 years of age from a paediatric emergency department (ED) (Table 1). Children were recruited if they had at least one episode of nonbilious, nonbloody vomiting in the preceding 4 h, and mild to moderate dehydration on initial assessment in the ED, based on a dehydration score. Subjects were randomly assigned to receive an orally disintegrating ondansetron tablet or placebo, and were started on oral rehydration therapy 15 min after receiving the tablet, via a standardized protocol (20). The investigators found that children who received a single dose of oral ondansetron were less likely to vomit, had greater oral intake and were less likely to be treated with IV fluids compared with children who received a placebo. There was no difference in the rate of hospitalization between the ondansetron group and the placebo group.

In 2008, Roslund et al (21) published a study in which they enrolled 106 children one to 10 years of age from a combined adult and paediatric ED (Table 1). Children were recruited if they had a clinical diagnosis of acute gastritis or gastroenteritis, mild to moderate dehydration and had failed controlled oral rehydration in the ED. Subjects were randomly assigned to receive a single weight-based dose of oral ondansetron or placebo, and were restarted on the oral rehydration protocol 30 min later. The investigators found that children who received oral ondansetron were less likely to receive IV fluids and less likely to be admitted to hospital compared with children who received a placebo (21).

In 2002, Ramsook et al (22) conducted a double-blinded, randomized controlled trial of 145 patients between six months and 12 years of age who had vomited at least five times during the preceding 24 h (Table 1). The patients were randomly assigned to receive a single dose of oral ondansetron, or a taste- and colour-matched placebo; oral rehydration was commenced 15 min later. Patients randomly assigned to receive oral ondansetron vomited less, were less likely to receive IV fluids and less likely to be subsequently admitted to hospital.

Decamp et al (25) published a meta-analysis in 2008 to specifically examine the use of various antiemetic drugs for children with acute gastroenteritis. As part of their analysis, they reviewed

six different studies involving ondansetron: the three studies described above and three other studies involving the use of IV ondansetron. Their analysis included data obtained from the original publications, as well as data from personal communications with the original authors. The results of their combined analysis of oral and IV ondansetron studies showed that subjects treated with ondansetron were at decreased risk for further emesis in the ED, IV fluid administration and hospital admission (RRs and 95% CIs are reported in Table 1) (25). The most significant adverse event noted from the various studies was an increased risk of diarrhea up to 48 h after administration of ondansetron. No other adverse events were common across all studies.

### CONCLUSION

Oral ondansetron therapy, as a single dose for paediatric gastroenteritis, is effective in reducing the frequency of vomiting and IV fluid administration in infants and children six months to 12 years of age who present to the ED with mild to moderate dehydration or who have failed a trial of oral rehydration therapy. Evidence suggests that oral ondansetron may be effective in reducing hospital admissions. The most common side effect of the administration of oral ondansetron in this context is diarrhea, which is usually self-limited in nature and lasts less than 48 h. Further studies are required to address its use and efficacy in the out-of-hospital setting.

### RECOMMENDATIONS

Oral ondansetron therapy, as a single dose, should be considered for infants and children six months to 12 years of age who present to the ED with vomiting related to suspected acute gastroenteritis, and who have mild to moderate dehydration or who have failed oral rehydration therapy. Because the most common side effect of ondansetron is diarrhea, its use is not routinely recommended in children with gastroenteritis whose predominant symptom is moderate to severe diarrhea. A reasonable weight-based oral dosing regimen for infants and children is the following:

- 8 kg to 15 kg: 2 mg
- 15 kg to 30 kg: 4 mg
- Greater than 30 kg: 6 mg to 8 mg

Oral rehydration therapy should be initiated 15 min to 30 min after administration of oral ondansetron.

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