

# Survey of nil per os duration of patients admitted to the emergency department due to vomiting

Wen-Chieh Yang, MD<sup>a,b</sup>, Yu-Jun Chang, PhD<sup>c</sup>, Ya-Chun Lin, MS<sup>d</sup>, Chun-Yu Chen, MD<sup>a,b</sup>, Yi-Chin Peng, MD<sup>a,b,\*</sup>, Han-Ping Wu, MD, PhD<sup>a,b,e,\*</sup>

## Abstract

During the acute phase of vomiting, even a small amount of water may not be tolerated by mouth. Early refeeding may cause re-vomiting in patients, whereas late refeeding may result in dehydration and hypoglycemia. Nil per os (NPO) may be generally recommended by primary physicians, but the appropriate NPO duration for these patients is still unclear.

The study aimed to identify the ideal NPO duration for patients with acute vomiting.

We prospectively recruited patients with vomiting who underwent NPO management and were administered antiemetic agents in the emergency department (ED) and the pediatric ED. The demographics, final diagnosis, clinical manifestations, medical management, NPO duration, and laboratory data were collected and analyzed to identify the ideal NPO duration.

A total of 304 patients with vomiting who were admitted in the ED were enrolled. The major diagnosis was acute gastroenteritis (AGE) (82.9%), followed by acute gastritis and colitis. Most patients were younger than 6 years (43.8%). Apart from abdominal pain and vomiting, nausea was the most common symptom (93.1%). NPO duration of 4 to 6 hours had the lowest rate of refeeding failure (3.7%) compared to the other NPO durations.

For patients with acute vomiting who are admitted to the ED, NPO duration of 4 to 6 hours may be necessary and should be recommended by primary ED physicians.

**Abbreviations:** AGE = acute gastroenteritis, ED = emergency department, IM = intramuscular, IV = intravenous, IVF = intravenous infusion, NPO = nil per os, SD = standard deviation.

**Keywords:** acute gastroenteritis, duration, nil per os, NPO, vomiting

## 1. Introduction

Whether a patient with vomiting should be fed or should fast is one of the biggest challenges encountered by physicians in the emergency department (ED). A few researchers questioned the clinical decision of fasting and asserted that prolonged fasting may compromise the immunity system, leading to poor out-

comes.<sup>[1–4]</sup> Some indicated that there was no clinical difference between oral and intravenous (IV) rehydration for children with acute gastroenteritis (AGE), even though they noted a higher risk of paralytic ileus in patients managed with oral rehydration.<sup>[5]</sup> For some particular stimuli, such as chemotherapy, food restriction and fasting seemed to not affect emesis.<sup>[6]</sup> One Cochrane systematic review found that patients with acute diarrhea and episode of vomiting had no significant difference in early and late refeeding.<sup>[7]</sup>

Nevertheless, many primary physicians may still recommend a period of fasting, nil per os (NPO), followed by gradual reintroduction of food for patients with AGE, those in critical conditions, and those undergoing operations (pre- and postoperatively).<sup>[8–11]</sup> Clinically, the appropriate NPO duration of patients with AGE varies, ranging from 0.5 to 48 hours, and is generally based on the experience of the physician.<sup>[7,8,11–17]</sup> On the other hand, approximately 50% to 80% of physicians would administer antiemetics to patients with AGE.<sup>[11,12,18]</sup> However, the ideal NPO duration for patients with acute vomiting with or without the use of antiemetics is not completely clear.

Therefore, we aimed to identify the ideal NPO duration for patients with acute vomiting, and further analyze the possible clinical variables resulting in refeeding failure in the ED.

## 2. Materials and methods

### 2.1. Patient population

We prospectively collected patients with acute vomiting who were admitted to the ED and pediatric ED of a tertiary medical hospital between January 2008 and December 2010. The patients who did not receive NPO management in the ED were excluded. In addition, patients with acute vomiting caused by

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W-CY and Y-JC contributed equally to this work.

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<sup>a</sup> Department of Pediatric Emergency, China Medical University Children's Hospital, China Medical University, <sup>b</sup> Department of Medicine, College of Medicine, China Medical University, <sup>c</sup> Laboratory of Epidemiology and Biostatistics, Changhua Christian Hospital, <sup>d</sup> Department of Nursing, Changhua Christian Hospital, Changhua, <sup>e</sup> Department of Medical Research, China Medical University Children's Hospital, China Medical University, Taichung, Taiwan.

\* Correspondence: Han-Ping Wu, Department of Medical Research, Department of Pediatric Emergency Medicine, Children's Hospital, China Medical University, Taichung, Taiwan, No. 2, Yuh-Der Road, Taichung 404, Taiwan (e-mail: arthur1226@gmail.com); Yi-Chin Peng, Department of Pediatric Emergency Medicine, Children's Hospital, China Medical University, Taichung, Taiwan, No. 2, Yuh-Der Road, Taichung 404, Taiwan (e-mail: godshooter32@gmail.com).

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non-gastrointestinal disorders, mechanical disorders, or by severe clinical disorders, such as acute abdomen were excluded from our series. The Institution Review Board and Ethics Committee approved the study protocol, and informed consent was not provided in this retrospective study.

## 2.2. Methods

The demographics, final diagnosis, clinical manifestations, medical management, duration of NPO, failure of refeeding, and laboratory data were all collected. Patients were divided into 3 groups according to their ages:

younger than 6 years;  
6 to 18 years; and  
older than 18 years.

In addition, NPO durations were classified into the following 4 groups:

(1) shorter than 4 hours;  
(2) 4 to 6 hours;  
(3) 7 to 8 hours; and  
(4) longer than 8 hours.

Outcomes were evaluated based on the occurrence of re-vomiting after refeeding within a short NPO duration. Duration of vomiting was defined as the period from the initial vomiting episode to the time of ED visit in the hospital. The frequency of vomiting and diarrhea was recorded based on the times the symptoms were noted in a 24-hour period. Data on the antiemetic drugs administered through IV route, intramuscular (IM) route, or intravenous infusion (IVF) in the ED were also gathered for further analysis.

In addition, the NPO duration depended on the decision and judgments of the primary physicians in the ED. Based on the information in the medical charts recorded in the ED, all patients drank a small amount of water before refeeding, and then started oral intake if they had no more nausea or vomiting for 10 minutes. Patients without vomiting after refeeding were categorized as the refeeding success group, and the definite NPO duration was recorded. In contrast, if patients re-vomited after refeeding, they were classified as the refeeding failure group.

## 2.3. Statistical analysis

Values are expressed as means  $\pm$  standard deviation (SD). The significant difference of continuous variables between the refeeding success and refeeding failure groups was analyzed using the Mann-Whitney *U* test. The categorical variables were analyzed using a Chi-Squared or a Fisher exact test when appropriate. Multivariate logistic regression analysis was performed to predict the refeeding failure group and identify the appropriate NPO duration. The significant levels were set at  $P < .05$  for all of the tests. Statistical analysis was performed using SPSS 16.0 software package (version 20.0; SPSS Inc., Chicago, IL, USA).

## 3. Results

A total of 304 patients with acute vomiting who were admitted to the ED and pediatric ED were enrolled in this study. The characteristics of our selected patients are listed in Table 1. Most patients were younger than 6 years (43.8%), followed by adult patients (33.6%). About 90% of patients with acute vomiting were in the acute phase within 2 days. Most of the patients with

**Table 1**

**The characteristics of patients with acute vomiting in the emergency department (N = 304).**

Variables	N (%)
Age (years)	
<6	133 (43.8)
6–18	69 (22.7)
>18	102 (33.6)
Female	139 (45.7)
Duration (days)	
1	169 (55.6)
2	102 (33.6)
3	20 (6.6)
4	13 (4.3)
Nausea	283 (93.1)
Diarrhea	161 (53)
Pyrexia	126 (41.4)
Abdominal distension	242 (79.6)
Diagnosis	
Acute gastritis	41 (13.5)
Acute gastroenteritis	263 (86.5)
Metoclopramide	160 (52.6)
IV	51 (31.9)
IM	3 (1.9)
IVF	106 (66.3)
NPO duration (hours)	
<4	61 (20.1)
4–6.9	219 (72.0)
7–8	18 (5.9)
>8	6 (2.0)
WBC ( $\mu$ L) <8k	58 (27.1)
8–12k	73 (34.1)
>12k	83 (38.8)
Neutrophil >75%	120 (56.3)
Band >5%	7 (3.4)
CRP >0.5 mg/dl	54 (53.5)

CRP = C-reactive protein, IM = intramuscular, IV = intravenous, IVF = intravenous infusion, NPO = nil per os, WBC = white blood cell.

acute vomiting suffered from nausea (93.1%), and about half of the patients had diarrhea (53%) and fever (41.4%). Apart from abdominal pain and vomiting, nausea (93.1%) and abdominal distension (79.6%) were the common symptoms. The major diagnosis of patients with vomiting was AGE (86.5%), followed by acute gastritis and colitis. Most patients (92.1%) can tolerate refeeding after 4 to 6 hours of fasting. Antiemetic agents were administered in 160 patients (52.6%) and 66.3% were given through IVF. For the antiemetic drugs, metoclopramide was commonly administered through IVF (66.3%), followed by the IV route in the ED. Patients administered an IM dose of metoclopramide were monitored for 30 to 60 minutes in the ED, and IV fluid therapy was initiated if the patient had frequent vomiting.

The comparison of clinical factors between the different refeeding outcomes is shown in Table 2. Among all the parameters, vomiting frequency and NPO duration were associated with refeeding outcomes ( $P = .007$ ;  $P = .023$ , respectively). Higher vomiting frequency and shorter fasting time period (<4 hours) may commonly lead to refeeding failure. Moreover, we found that the NPO duration of 4 to 6 hours had the highest rate of refeeding success in patients with vomiting. Age group, gender, vomiting duration (days), nausea, diarrhea, fever degree, laboratory data, and even the use of antiemetic agents or not showed no statistical difference between the different refeeding outcome groups.

**Table 2**  
Analysis of clinical factors between the 2 refeeding outcomes.

Variables	Refeeding success	Refeeding failure	P value
	(n=286) N (%) / mean ± SD (N)	(n=18) N (%) / mean ± SD (N)	
Age (y/o)	16.0 ± 18.8	16.0 ± 18.0	.811
<6	125 (43.7)	8 (44.4)	.790
6–18	66 (23.1)	3 (16.7)	
>18	95 (33.2)	7 (38.9)	
Female	129 (45.1)	10 (55.6)	.388
Duration (days)	2.0 ± 1.0	1.0 ± 1.0	.196
1	156 (54.5)	13 (72.2)	.241
2	99 (34.6)	3 (16.7)	
3	18 (6.3)	2 (11.1)	
4	13 (4.5)	0	
Nausea	266 (93)	17 (94.4)	1.000
Vomiting frequency (times)	3.0 ± 2.0	5.0 ± 3.0	.007
Diarrhea	150 (52.4)	11 (61.1)	.475
Frequency (times)	2.0 ± 3.0	3.0 ± 3.0	.239
Pyrexia	119 (41.6)	7 (38.9)	.820
Fever degree (°C)	38.2 ± 0.6 (119)	38.3 ± 0.3 (7)	.198
Abdominal distension	225 (78.7)	17 (94.4)	.137
Diagnosis			
Acute gastritis	40 (14)	1 (5.6)	.637
Acute gastroenteritis	246 (86)	17 (94.4)	
Metoclopramide	152 (53.1)	8 (44.4)	.464
IV	49 (32.2)	2 (25)	1.000
IM	3 (2)	0	
IVF	100 (65.8)	6 (75)	
NPO duration (hours)	5.0 ± 2.0	5.0 ± 2.0	.640
<4	54 (18.9)	7 (38.9)	.023
4–6	211 (73.8)	8 (44.4)	
7–8	16 (5.6)	2 (11.1)	
> 8	5 (1.7)	1 (5.6)	
Laboratory data			
Blood			
WBC (/ $\mu$ L)	12.7 ± 21.7 (202)	26.2 ± 53.1 (12)	.897
<8k	54 (26.7)	4 (33.3)	.810
8–12k	70 (34.7)	3 (25)	
>12k	78 (38.6)	5 (41.7)	
Neutrophil > 75%	113 (56.2)	7 (58.3)	.886
Band (%)	3.0 ± 7.0 (196)	2.0 ± 3.0 (12)	.587
Band > 5%	6 (3.1)	1 (8.3)	.344
CRP	1.4 ± 2.3 (94)	1.8 ± 2.6 (7)	.867
CRP > 0.5 mg/dl	51 (54.3)	3 (42.9)	.702

CRP = C-reactive protein, IM = intramuscular, IV = intravenous, IVF = intravenous infusion, NPO = nil per os, WBC = white blood cell.

According to the results of the multivariate of logistic regression analysis (Table 3), patients suffering from abdominal distension and those with frequent vomiting had 10.6 and 1.6 times odds ratio, respectively, of refeeding failure. In contrast, the NPO duration of 4 to 6 hours had about 4 times odds ratio of refeeding success, indicating that this NPO duration may be appropriate for patients with acute vomiting in the ED.

#### 4. Discussion

Abdominal pain and vomiting are the major symptoms manifested by patients with acute vomiting in the ED. Apart from vomiting, symptoms are usually associated with diarrhea, intermittent and colicky pain, and fever, which are mostly caused by an infection. Patients with bacterial AGE generally suffer from severe abdominal pain and prolonged clinical course. During the

**Table 3**  
Results of the logistic regression analysis of refeeding failure in patients with vomiting who are placed on NPO status.

Variables	Odds ratio	95% C.I.	P value
Vomiting frequency (times)	1.564	1.231–1.986	<.001
Abdominal distension	10.551	1.002–111.153	.050
NPO duration (hours)			
<4	1.000		
4–6.9*	0.241	0.076–0.760	.015
7–8	0.824	0.128–5.317	.839
>8	0.708	0.050–9.949	.798

NPO = nil per os.  
\* P < .05.

acute phase of vomiting, even a small amount of water may not be tolerated by mouth, and poor oral intake may result in dehydration, hypoglycemia, or even shock. Appropriate IV fluid supplement is necessary for patients with moderate to severe dehydration. In addition, transient fasting for patients with AGE in acute vomiting phase is also necessary. However, the ideal NPO duration still remains unclear. Moreover, whether antiemetics and oral hydration therapy shorten the NPO duration and whether the clinical variables prolong the NPO duration are still unknown. We have clarified these issues by performing this study.

Based on our results, NPO, but not antiemetic drugs such as domperidone, may be majorly used for management of patients with acute vomiting to increase the likelihood of refeeding success. Moreover, the appropriate NPO duration for these patients may be 4 to 6 hours. The odds ratio for refeeding failure was 0.24 and about 90% of patients were able to tolerate refeeding after 4 to 6 hours of NPO. None of the patients was unable to tolerate refeeding after 12 hours of NPO. Therefore, once the patients cannot tolerate refeeding after 12 hours of NPO, further assessment of vomiting should be conducted and reasonable managements should be performed.

The major clinical factors related to refeeding failure included abdominal distension (10.55 of odds ratio for refeeding failure) and frequent vomiting (1.56 of odds ratio for refeeding failure). Other factors, including age, gender, bacterial infections, duration of vomiting, dehydration status, laboratory data, fever degree, diarrhea, and nausea before NPO, did not have significant difference between the different refeeding outcomes. Although the different age groups indicate different maturity stages of gastrointestinal function and different pathogens in the gut, we were not able to investigate this trend in this study. In clinical settings, AGE patients with abdominal distension may be associated with abnormal bowel movements and paralytic ileus. A previous study also recommended that oral rehydration solution should not be used for children with paralytic ileus.<sup>[5]</sup> In general, despite the age and duration of vomiting, patients with frequent vomiting, bilious vomiting, and distended abdomen should have a prolonged NPO duration.<sup>[11]</sup>

#### 5. Conclusion

For patients with acute vomiting due to AGE, NPO duration of 4 to 6 hours should be recommended. Moreover, despite the patient's age and vomiting duration, patients with frequent vomiting, bilious vomiting, and distended abdomen have a prolonged NPO duration. Furthermore, if the patients could not tolerate refeeding after 12 hours of NPO, a further assessment of the patient's condition should be conducted.

## Author contributions

WCY and YJC analyzed and interpreted the data as well as drafted the manuscript; YCL and CYC reviewed the medical records, interpreted the data, and analyzed the data. HPW and YCP designed and oversaw the study, interpreted the data, and revised the manuscript. All authors have read and approved the final manuscript for publication.

**Data curation:** Ya-Chun Lin.

**Formal analysis:** Yu-Jun Chang.

**Investigation:** Yu-Jun Chang, Chun-Yu Chen.

**Methodology:** Chun-Yu Chen.

**Supervision:** Yi-Chin Peng, Han-Ping Wu.

**Validation:** Han-Ping Wu.

**Writing – original draft:** Wen-Chieh Yang.

**Writing – review & editing:** Yi-Chin Peng.

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