Questionnaire-Based Survey on Epidemiology of Functional Gastrointestinal Disorders and Current Status of Gastrointestinal Motility Testing in Asian Countries

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Keywords

Constipation · Colonic motility · Functional dyspepsia · Gastric emptying · Gastroparesis · Irritable bowel syndrome

Abstract

Background/Aims: Functional gastrointestinal disorders (FGIDs) are diagnosed and classified using the latest Rome IV criteria, released in 2016. Epidemiology of FGID diagnosed by the Rome IV criteria and current clinical application of

gastrointestinal motility testing in Asian countries are not well known. The aims of this survey are to elucidate the present situation of epidemiology and diagnostic tests of FGID in clinical practice in some East and Southeast Asian countries.

Methods: The questionnaire focusing on current situation of FGID diagnosis and gastrointestinal motility testing was distributed to members of the International Gastroenterology Consensus Symposium study group and collected to be analyzed. **Results:** The prevalence rates of subtypes of both functional dyspepsia (FD) and irritable bowel syndrome (IBS)

are relatively similar in all Asian countries. In these countries, most patients underwent both upper endoscopy and *Helicobacter pylori* test to diagnose FD. Colonoscopy was also frequently performed to diagnose IBS and chronic constipation. The frequency of gastrointestinal motility testing to examine gastric emptying and colonic transit time varied among Asian countries. **Conclusions:** This survey revealed epidemiology of FGIDs and current status of gastrointestinal motility testing in some East and Southeast Asian countries.

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Introduction

Functional gastrointestinal disorders (FGIDs) are a group of gastrointestinal disorders defined by specific symptoms and absence of structural or chemical abnormalities that cause these symptoms [1]. FGIDs consist of several different diseases including functional dyspepsia (FD) [2] and irritable bowel syndrome (IBS) [3], which are very common in clinical setting. The gastrointestinal symptoms may represent any combination of symptoms, such as impaired gastrointestinal motility [4, 5], visceral hypersensitivity [4, 6], gut microbiota [7, 8], altered mucosal function [7], and/or central nervous system processing [4, 9]. The Rome IV criteria [1], released in 2016, have been widely used to diagnose and classify FGIDs worldwide. Furthermore, several gastrointestinal motility tests have been performed as diagnostic methods of FGID especially in Western countries. However, the epidemiology of FGID diagnosed by the Rome IV criteria is unknown and clinical application of gastrointestinal motility testing is not established in Asian countries. In this

survey, we aim to elucidate present situation of epidemiology and diagnostic tests of FGID in clinical practice using the questionnaire in some East and Southeast Asian countries.

Methods

Participant

This survey was conducted by the International Gastrointestinal Consensus Symposium (IGICS). Representatives of China, Indonesia, Hong Kong, Japan, Korea, Philippines, Singapore, and Thailand were selected from IGICS committee, and the committee sent them a questionnaire on epidemiology of FGID based on the Rome IV criteria and functional GI motility testing in clinical practice. The definition of FGID was based on Rome IV criteria to select the more homogenous subset from various patients. A representative distributed this questionnaire to major institutions including universities, hospitals, and clinics in each country, starting at the beginning of October 2019. Responses from institutes were collected by the end of November 2019. The questionnaire consisted of 23 questions focusing on the following: (1) background of respondents and institutes; (2) epidemiology and diagnostic tools of FD, gastroparesis (GP), IBS, and chronic constipation (CC) in each institution; (3) current situation of several GI motility testing including gastric emptying (GE) and colonic transit time. The details of the questionnaire are described in Appendix.

Statistical Analysis

The data were expressed as mean or median as appropriate. The percentages of FD, GP, IBS, and CC cases were obtained by dividing the number of the cases by persons who visited the institutes per month. When an answer to a question had a certain range, mean value was used (e.g., if a respondent wrote “5–10,” we used “7.5” as the answer to the item). The significance of differences among above 8 countries was assessed with the Kruskal-Wallis test or χ^2 test as appropriate. p value <0.05 was considered to be statistically significant.

Table 1. Background of the respondents

Country	Number of institutes*	Patients numbers/month		Specialty			
		average	(range)	gastroenterology	surgery	general physician	others
China	21	10,100	(200–40,000)	21	0	0	0
Hong Kong	19	2,800	(250–18,000)	17	0	2	0
Indonesia	10	1,600	(100–7,000)	5	1	2	2
Japan	72	1,500	(50–7,300)	66	2	4	0
Korea	24	15,000	(280–250,000)	24	0	0	0
Philippines	28	500	(20–2,000)	28	0	0	0
Singapore	4	1,200	(500–2,000)	4	0	0	0
Thailand	18	1,300	(80–10,000)	18	0	0	0
All countries	196			181	3	8	2

* There was one respondent from each institute.

Results

Background of Respondents and Institutes

A total of 196 respondents who were employed at 196 institutes returned the questionnaire. The number of institutes participating in this survey was 72 in Japan and 124 in China, Indonesia, Hong Kong, Korea, Philippines, Singapore, or Thailand. With regard to their specialty, the respondents of each institute were mostly gastroenterologists, and the remaining respondents were surgeons, general physicians, or others (Table 1).

Prevalence of FGIDs

Functional Dyspepsia

The median percentage of patients who were diagnosed as FD defined by the Rome IV criteria among patients who visited the respondent's institution was 10.0, 15.0, 8.3, 3.3, 11.2, 20.0, 8.8, or 4.5% in China, Hong Kong, Indonesia, Japan, Korea, Philippines, Singapore, and Thailand, respectively, showing significant differences between countries (Fig. 1).

Figure 2 shows prevalence of subtypes of FD using the Rome IV criteria in each country. Epigastric pain syndrome (EPS) was more prevalent than postprandial distress syndrome (PDS) in Hong Kong, Indonesia, Korea,

Fig. 1. Percentage of patients who were diagnosed as FD, GP, IBS, or CC among patients who visited each institution. Box plots indicate the median. ● spots indicate outliers. There were significant differences between countries ($p < 0.001$, Kruskal-Wallis test). FD, functional dyspepsia; GP, gastroparesis; IBS, irritable bowel syndrome; CC, chronic constipation.

Fig. 2. Prevalence of subtypes of FD in each country. FD, functional dyspepsia; EPS, epigastric pain syndrome; PDS, postprandial distress syndrome; Overlap, overlap of EPS and PDS.

Table 2. The most important factors to diagnose GP as rated by respondents

Rank	1 (most important)	2	3	4 (least important)
China	GE	Symptoms	Endoscopy	Questionnaire
Hong Kong	GE	Symptoms	Endoscopy	Questionnaire
Indonesia	Symptoms	Questionnaire	Endoscopy	GE
Japan	Symptoms	Endoscopy	Questionnaire	GE
Korea	Symptoms	GE	Questionnaire	Endoscopy
Philippines	Symptoms	Questionnaire	Endoscopy	GE
Singapore	GE	Endoscopy	Symptoms	Questionnaire
Thailand	Symptoms	Endoscopy	GE	Questionnaire

GP, gastroparesis; GE, gastric emptying.

and Philippines, and PDS was more prevalent than EPS in China, Singapore, and Thailand. The prevalence of EPS and PDS were almost equal in Japan. One-fourth of FD patients showed overlap between EPS and PDS in 7 countries except Korea (Fig. 2).

The percentage of respondents who always or often use upper endoscopy and *Helicobacter pylori* (*H. pylori*) test to diagnose FD was more than 60% in 8 countries (Fig. 3a, b). That of respondents who always or often use questionnaire on symptoms of FD to diagnose FD was more than 50% in China, Indonesia, and Singapore (Fig. 3c).

Gastroparesis

The median percentage of patients who were diagnosed as GP among patients who visited the respondent's institution was 0.2, 0.3, 1.4, 0.5, 0.7, 10.0, 1.0, or 1.5% in China, Hong Kong, Indonesia, Japan, Korea, Philippines, Singapore, and Thailand, respectively, showing significant differences between countries (Fig. 1). The most important factors in the diagnosis of GP were GP symptoms such as nausea or vomiting in Indonesia, Japan, Korea, Philippines, and Thailand and the GE tests in China, Hong Kong, and Singapore. Questionnaire on GP symptoms was thought to be the second important factor in the

Fig. 3. a Distribution of frequencies (respondents used questionnaire on symptoms of FD to diagnose FD). **b** Distribution of frequencies (respondents used upper endoscopy to diagnose FD). **c** Distribution of frequencies (respondents used *H. pylori* infection to diagnose FD. FD, functional dyspepsia).

diagnosis of GP in Indonesia and Philippines as well as upper endoscopy in Japan, Singapore, and Thailand (Table 2).

Irritable Bowel Syndrome

The median percentage of patients who were diagnosed as IBS among patients who visited the respondent's institution was 5.0, 10.0, 1.6, 3.2, 7.7, 12.3, 9.4, or 3.1% in

China, Hong Kong, Indonesia, Japan, Korea, Philippines, Singapore, and Thailand, respectively, showing significant differences between countries (Fig. 1). Figure 4 shows prevalence of subtypes of IBS using the Rome IV criteria in each country. Diarrhea predominant (IBS-D) was more prevalent than constipation predominant (IBS-C) in China, Hong Kong, Indonesia, Korea, Japan, and Thailand, whereas IBS-C was more prevalent than IBS-D

Fig. 4. The prevalence of subtypes of FD in each country. IBS-D, diarrhea predominant; IBS-C, constipation predominant; IBS-M, mixed bowel habit.

in Philippines and Singapore. Mixed bowel habits (IBS-M) were found in 16–29% (Fig. 4).

The percentage of respondents who always or often use colonoscopy to diagnose IBS was more than 60% in all 8 countries (Fig. 5a). That of respondents who always or often use questionnaire on symptoms of IBS to diagnose IBS was 71.4, 55.6, 58.3, 54.2, or 51.7% in China, Indonesia, Japan, Korea, and Philippines, respectively (Fig. 5b). In contrast, the percentage of respondents who rarely or never use serum celiac-specific antibody to diagnose IBS was more than 90% in Hong Kong, Indonesia, Japan, Korea, and Thailand (Fig. 5c).

Chronic Constipation

The median percentage of patients who were diagnosed as CC among patients who visited the respondent's institution was 5.0, 2.8, 2.0, 5.9, 6.1, 16.7, 3.0, or 8.0% in China, Hong Kong, Indonesia, Japan, Korea, Philippines, Singapore, and Thailand, respectively, showing significant differences between countries (Fig. 1).

The percentage of respondents who always or often use colonoscopy to diagnose CC was more than 70% in all 8 countries (Fig. 6a). The percentage of respondents who rarely or never use colonic transit time tests to diagnose CC was more than 60% in China, Hong Kong, Indonesia, Japan, Philippines, and Thailand (Fig. 6b).

Gastrointestinal Motility Testing

GE Tests

GE tests were commonly used in clinical setting of Korea and Singapore. They were used in clinical setting or research only in half of institutions of Thailand. GE tests were not performed in more than 60% of institutions in other 5 countries (Table 3). Scintigraphy was used the most to measure GE in Hong Kong, Japan, Korea, Philippines, Singapore, and Thailand, whereas ^{13}C breath test was used the most in China (Table 4).

Colonic Transit Time Tests

Colonic transit time tests were commonly used in clinical setting in Korea and Singapore. They were used in clinical setting or research only in almost half of institutions of China. Colonic transit time tests were not performed in 66.7–100% institutions in other 5 countries (Table 5). Radiopaque marker method was used the most to measure colonic transit time in 7 countries except Indonesia (Table 6).

Discussion

FD is defined as a condition which chronically presents bothersome symptoms centered at the upper abdomen, such as postprandial fullness, early satiation, epigas-

Fig. 5. a Distribution of frequencies (respondents used questionnaire on symptoms of IBS for diagnosis of IBS). **b** Distribution of frequencies (respondents used colonoscopy to diagnose IBS). **c** Distribution of frequencies (respondents used serum celiac-specific antibody to diagnose IBS). IBS, irritable bowel syndrome.

tric pain, and epigastric burning without any structural disease that is likely to explain the symptoms [2]. FD is a very common disease and several large-scale studies [10, 11] reported that its prevalence is 8–30% worldwide. In this survey, the median percentage of FD patients who visited the institutions in each country ranged from 3.3 to 20%. The prevalence of FD could differ depending on the community base, hospital setting, or whether subjects

were general population or outpatients. The prevalence of dyspepsia in Japan was estimated to be 21.9%, and the percentage of patients who visited a medical institute was only 5.7% of Japanese population [12]. In other words, only one-fourth of dyspeptic subjects visited a medical institute. These data support our results.

In the Rome IV criteria, FD patients are categorized into 3 subtypes: EPS, PDS, and the overlap of EPS and

Fig. 6. a Distribution of frequencies (respondents used colonoscopy to diagnose CC). **b** Distribution of frequencies (respondents used colonic transit time tests to diagnose CC). CC, chronic constipation.

Table 3. Number of institutes where respondents performed GE test

Country	Yes (clinical setting)	Yes (research only)	No*
China	5	2	12
Hong Kong	2	4	13
Indonesia	1	1	7
Japan	2	4	66
Korea	18	3	3
Philippines	3	3	20
Singapore	3	1	0
Thailand	3	2	5

GE, gastric emptying. * Significant differences between countries ($p < 0.001$, χ^2 test).

PDS [2]. Regarding the prevalence of subtypes of FD, Oshima and Miwa [13] have confirmed in 6 reports that PDS was more prevalent than EPS, defined by the Rome

III criteria in both Europe and Asia. Aziz et al. [11] have demonstrated that the proportions of subgroups are 18% in EPS, 61% in PDS, and 21% in overlap in the USA, Canada, and UK using the Rome IV criteria. However, EPS was more prevalent than PDS in 8 countries including Hong Kong, Indonesia, Korea, and Philippines in this survey. The prevalence of EPS and PDS was almost equal in Japan. There might be epidemiological differences in FD between Western countries and Asian countries.

To diagnose FD, upper endoscopy and *H. pylori* test were always or often used in more than half of institutions of 8 countries. A diagnosis of FD is based on both patients' self-reported symptoms and exclusion of organic disease. Upper endoscopy is recommended to exclude organic disease because it is impossible to distinguish FD and organic dyspepsia only using subjective symptoms.

The relationship between *H. pylori* infection and FD remains controversial. The USA, Korea, Thailand, and Japanese clinical practice guidelines for the management

Table 4. Number of institutes where respondents performed tests to evaluate GE

Country	Scintigraphy	¹³ C breath test	Radiopaque markers	Ultra-sonography	Wireless capsule
China	3	4	2	0	2
Hong Kong	6	0	1	0	0
Indonesia	0	0	1	1	0
Japan	2	1	2	1	2
Korea	19	1	0	0	0
Philippines	3	2	0	0	2
Singapore	2	1	1	0	0
Thailand	4	1	1	0	0

GE, gastric emptying.

Table 5. Number of institutes where respondents performed colonic transit time test

Country	Yes (clinical setting)	Yes (research only)	No*
China	8	1	10
Hong Kong	1	3	14
Indonesia	0	0	9
Japan	0	3	69
Korea	17	2	3
Philippines	2	3	17
Singapore	3	1	0
Thailand	3	0	6

* Significant differences between countries ($p < 0.001$, χ^2 test).

Table 6. Number of institutes which performed tests to evaluate colonic transit time

Country	Scintigraphy	Radiopaque markers	Wireless capsule
China	2	8	3
Hong Kong	0	4	0
Indonesia	0	0	0
Japan	0	3	0
Korea	0	18	1
Philippines	1	2	2
Singapore	0	3	0
Thailand	0	3	0

of FD recommend to assess the *H. pylori* infection and eradicate *H. pylori* in positive FD patients. Patients who remain symptom free 6–12 months after eradication are considered to be the “*H. pylori*-associated FD” cases [14–16]. A recent report indicated that approximately 60% of *H. pylori*-associated dyspepsia patients improved at 1 month after eradication. The questionnaire at less than 3 month after eradication might help to diagnose *H. pylori*-associated dyspepsia [17].

GP is defined as a syndrome in which GE is objectively delayed without mechanical obstruction showing cardinal symptoms including early satiety, postprandial fullness, nausea, vomiting, bloating, and upper abdominal pain [18, 19]. GP can be categorized into some subsets based on its etiology. Soykan et al. [20] reported that diabetic (29%), postsurgical (13%), and idiopathic (36%) origins, and the remaining cases represented Parkinson's

disease and collagen-vascular disorders. GP is a relatively common disease in Western countries, and the 10-year incidence of GP has been reported to be 5.2% in type 1 diabetes, 1% in type 2 diabetes, and 0.2% in nondiabetic controls in a US community [21]. In contrast, the median percentage of GP patients who visited the respondent's institution was from 0.2 to 1.5% in 7 countries except Philippines.

GP is diagnosed using both cardinal symptoms and GE test. Symptoms of GP are often evaluated using the Gastroparesis Cardinal Symptom Index (GCSI), a specific questionnaire for GP. The most important factor in the diagnosis of GP was the GE test in China, Hong Kong, and Singapore, whereas it was the least important in Indonesia, Japan, and Philippines. Furthermore, the least important factor was the questionnaire in China, Hong Kong, Singapore, and Thailand. The prevalence

of GP in Asian countries is probably lower than Western countries, or GP may have received relatively little attention in Asian countries. Recent practice survey of GP by Asian Neurogastroenterology and Motility Association reported that the reason why GP can be challenging to diagnose might be due to the lack of instrument [22].

IBS is a representative FGID characterized by chronic or recurrent abdominal pain associated with abnormal defecation or a change in bowel habits [3]. The worldwide prevalence of IBS is 11.2% based on a meta-analysis of 80 studies involving 260,960 subjects [23]. That of IBS ranged from 10 to 15% in a systematic review of IBS in North America. However, the median percentage of IBS patients who visited the respondent's institutions was from 1.6 to 12.3% and less than 10% in 6 countries in our survey. Miwa [24] reported the prevalence of IBS in Japan was 13.1%. Another paper demonstrated that the prevalence of IBS who visited a general hospital in Japan was 2.4% [25]. Many IBS patients may have not visited medical institutions.

IBS patients are categorized into 4 subgroups in the Rome IV: IBS-D, IBS-C, IBS-M, and unclassified (IBS-U) [3]. A review of 8 studies showed that IBS-D is more prevalent than IBS-C. No difference was observed in the prevalence of subtypes of IBS between Western countries and Asia.

To diagnose IBS, colonoscopy and questionnaire are always or often used in more than 50% of institutions in 8 countries and 7 countries, respectively. Both colonoscopy and questionnaire are recommended to diagnose IBS in Japanese clinical guideline [26]. Colonoscopy has a diagnostic value to exclude organic disease. Questionnaires are also useful in the diagnosis of IBS.

In contrast, serum celiac-specific antibody are not examined in most institutions in Asian countries. Celiac disease is a chronic immune-mediated disease induced by dietary gluten in genetically predisposed individuals [27, 28]. Celiac disease can present many IBS-like gastrointestinal symptoms including diarrhea, bloating, and abdominal pain. The prevalence of celiac disease is ~1.0% of the population in many regions of the world [28], and it significantly increased in Western countries. However, eastern Asia shows low prevalence rate of celiac disease probably due to both a lack of gluten predisposition and a low consumption of wheat.

CC is a very common disease. Its prevalence in general population is approximately 14% based on a large meta-analysis of 45 population-based survey, comprising 26,040 adults, and more than 20% in elderly ≥70

years old [29–31]. However, the median percentage of CC patients who visited respondent's institutions was from 2.0 to 16.7% and less than 10% in 7 countries. Most of CC patients probably did not visit medical institutions.

To diagnose CC, colonoscopy is always or often used in more than 50% of institutions in 8 countries. CC is either primary or secondary (attributed to another disease such as colon cancer, diabetes mellitus, or Parkinson's disease). Primary CC consists of functional constipation and IBS-C. Colonoscopy is essential to exclude organic disease including colon cancer.

The frequency of gastrointestinal motility testing including GE and colonic transit time varied among Asian countries. There are many gastrointestinal motility or function testing. Most of them are not widely used in clinical setting in Asia except Korea and Singapore. GE tests are needed to diagnose GP, and disturbance of GE is involved in pathogenesis of FD. Many studies indicate that GE is significantly delayed in almost 20–35% of FD patients [32, 33]. The current gold standard in diagnostic assessment of GP is GE scintigraphy. However, the test is expensive, extensive, and unavailable in most hospitals even in Western countries. Other methods to measure GE are breath test or wireless motility capsule. ¹³C breath test is a reliable, noninvasive, and simple test to evaluate GE. Scintigraphy and ¹³C breath test are reported to give similar results for GE [34].

CC is classified into 3 categories based on assessments of colonic transit and anorectal function: normal transit constipation, slow transit constipation, and pelvic flow dysfunction [35]. Recently, Bharucha and Lacy [36] showed a treatment algorithm for CC. Colonic transit time should be assessed when the symptoms do not improve after treatment of secretagogue or prokinetic agents. The radiopaque marker method is an accurate and widely used technique to evaluate colonic transit time [37]. In addition, colonic transit time has been reported to be faster in Asian populations than in the West [38, 39]. Gastrointestinal motility tests including ¹³C breath test and radiopaque marker method are desired in all Asian countries.

In conclusion, this questionnaire survey revealed epidemiology of FGIDs and current status of gastrointestinal motility testing in various Asian countries. The frequency of FD, GP, IBS, and CC varied significantly among Asian countries. In addition, cooperation to develop skills to use gastrointestinal motility testing more effectively in FGIDs is necessary in all Asian countries.

Appendix

Please check the appropriate box or specify your answer in the blank spaces. In principle, the definition of each disease is according to Rome IV criteria. However, it depends on the situation of each country respectively.

General

1. What is your country of residence?

✓	
	China
	Hong Kong
	Indonesia
	Japan
	Korea
	Philippines
	Singapore
	Thailand
	Other

2. What is your specialty?

✓	
	gastroenterology
	gastrointestinal surgery
	general physician
	Other

3. How many patients do visit your department of the hospital per month on average?

	patients /month
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4. How many patients do undergo upper endoscopy in your department per month on average?

	patients /month
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5. How many patients do undergo colonoscopy in your department per month on average?

	patients /month
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Functional dyspepsia (FD)

6. How many functional dyspepsia (FD) patients do visit your department of the hospital per month on average?

	patients /month
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7. What is the percentage of subgroups in FD patients who are treated in your department?

epigastric pain syndrome		%
postprandial distress syndrome		%
overlap		%

8. How often do you perform the following examinations to diagnose and/or to make the differential diagnosis of FD?

a. questionnaire on symptoms of FD

	always		often		sometimes		rarely		never
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b. barium upper gastrointestinal radiography

	always		often		sometimes		rarely		never
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c. upper endoscopy

	always		often		sometimes		rarely		never
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d. abdominal ultrasonography

	always		often		sometimes		rarely		never
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e. abdominal computer tomography (CT)

	always		often		sometimes		rarely		never
--	--------	--	-------	--	-----------	--	--------	--	-------

f. gastric emptying test

	always		often		sometimes		rarely		never
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g. evaluation test of *Helicobacter pylori* infection

	always		often		sometimes		rarely		never
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h. others

	always		often		sometimes		rarely		never

Gastroparesis

9. How many gastroparesis patients do visit your department of the hospital per month on average?

	patients /month
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10. What is the percentage of the etiology in gastroparesis patients who are treated in your department?

diabetes mellitus		%
idiopathic		%
postsurgical		%
others		%

11. What do you think is the most important for diagnosing Gastroparesis?

Number the items in order from 1 (most important) to 4 (least important).

1-4	
	symptoms of vomiting, nausea, epigastric pain, early satiety and/or postprandial fullness
	patient questionnaire on symptoms of Gastroparesis
	upper endoscopy
	gastric emptying test

Irritable bowel syndrome (IBS)

12. How many irritable bowel syndrome (IBS) patients do visit your department of the hospital per month on average?

	patients /month
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13. What is the percentage of subtypes in IBS patients who are treated in your department?

diarrhea-predominant		%
constipation-predominant		%
mixed type		%
unknown		%

14. How often do you perform the following examinations to diagnose and/or to make the differential diagnosis of IBS?

a. questionnaire on symptoms of IBS

	always		often		sometimes		rarely		never
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b. abdominal computer tomography (CT)

	always		often		sometimes		rarely		never
--	--------	--	-------	--	-----------	--	--------	--	-------

c. abdominal magnetic resonance imaging (MRI)

	always		often		sometimes		rarely		never
--	--------	--	-------	--	-----------	--	--------	--	-------

d. colonoscopy

	always		often		sometimes		rarely		never
--	--------	--	-------	--	-----------	--	--------	--	-------

e. fecal occult blood test

	always		often		sometimes		rarely		never
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f. fecal bacterial culture

	always		often		sometimes		rarely		never
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g. lactose tolerance test

	always		often		sometimes		rarely		never
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h. hydrogen breath test

	always		often		sometimes		rarely		never
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i. serologic tests for celiac disease

	always		often		sometimes		rarely		never
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j. others

	always		often		sometimes		rarely		never

Chronic constipation

15. How many chronic constipation patients do visit your department of the hospital per month on average?

	patients /month
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16. How often do you perform the following examinations to diagnose and/or to make the differential diagnosis of chronic constipation?

a. questionnaire on symptoms of chronic constipation

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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b. abdominal ultrasonography

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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c. abdominal computer tomography (CT)

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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d. abdominal magnetic resonance imaging (MRI)

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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e. colonoscopy

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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f. fecal occult blood test

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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g. colonic transit time

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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h. others

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never

Gastrointestinal motility testing

17. Do you perform the gastric emptying test in your department?

☒	
☐	Yes (performed commonly in clinical setting)
☐	Yes (performed for research)
☐	No

18. If you answered Yes, which testing do you perform as the gastric emptying test?

☒	
☐	scintigraphy (radio-isotope technique)
☐	¹³ C breath test
☐	real-time ultrasonography
☐	radio-paque markers
☐	wireless capsule or capsule endoscopy
☐	others

19. How often do you perform those gastric emptying tests?

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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20. Do you perform the colonic transit time test in your department?

☒	
☐	Yes (performed commonly in clinical setting)
☐	Yes (performed for research)
☐	No

21. If you answered Yes, which testing do you perform as the colonic transit time test?

☒	
☐	scintigraphy (radio-isotope technique)
☐	radiopaque markers
☐	wireless capsule or capsule endoscopy
☐	others :

22. How often do you perform those colonic transit time tests?

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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23. How often do you perform the following gastrointestinal function testing to diagnose and/or to treat functional gastrointestinal disorders?

a. pH monitoring and/or impedance

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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b. high resolution manometry (esophagus, stomach)

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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c. anorectal manometry (including high resolution)

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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d. small intestinal or colonic manometry (including high resolution)

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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e. electrogastrography

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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f. gastric barostat

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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g. rectal barostat

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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h. drink test

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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i. barium esophagography

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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j. barium radiography (small intestine, colon)

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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k. oro-cecal transit time

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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l. cine MRI

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never
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m. others

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never

n. others

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never

o. others

☐	always	☐	often	☐	sometimes	☐	rarely	☐	never

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Statement of Ethics

This survey is questionnaire based not to patients but to each institution, and personal information is not handled. This kind of study does not require the approval of ethical review board according to the Japanese “guidelines for medical and health research involving human subjects” by Japanese Ministry of Health, Labor, and Welfare.

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Author Contributions

Dr. Takeshi Kamiya designed the study, collected and analyzed the questionnaire, and drafted the manuscript. Dr. Satoshi Osaga performed the statistical analysis. Drs. Eiji Kubota, Shin Fukudo, Satoshi Motoya, Kazunari Murakami, Akihito Nagahara, Akiko Shiotani, Mitsushige Sugimoto, Hidekazu Suzuki, Toshio Watanabe, Satoru Yamaguchi, Francis K.L. Chan, Ki-Baik Hahm, Kwong Ming Fock, and Qi Zhu reviewed and aggregated the questionnaire.

Conflict of Interest Statement

The authors have no conflicts of interests to declare.

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