

## Changes in management of acute pancreatitis before and after the publication of evidence-based practice guidelines in 2003

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### Abstract

**Background** The Japanese Guidelines for the Management of Acute Pancreatitis was published in 2003. However, the impact of the guidelines on physicians' practice patterns has not been well known.

This article is based on the studies first reported in the JPN guidelines for the management of acute pancreatitis. 3rd ed. JPN Guidelines 2010 (in Japanese). Tokyo: Kanehara; 2009.

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**Methods** To examine the current clinical practices in the management of acute pancreatitis, we conducted a questionnaire survey with members of three societies involved in the treatment of pancreatic diseases and abdominal emergency medical care. Questions included diagnostic and treatment processes considered important in the management of acute pancreatitis in addition to demographic data, experience in medical care, and areas of specialty of respondents. We also examined changes in the treatment of

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acute pancreatitis before and after publication of the Guidelines.

**Results** Of 1,000 society members to whom questionnaires were mailed, 590 responded. Respondents who had read the Guidelines also handled significantly more cases in the most recent 3 years. A variety of changes were observed in the performance of clinical practices before and after publication of the Guidelines. The use of amylase in the assessment of severity decreased significantly, while its use for determination of severity scores increased significantly after publication of the Guidelines. In treatment, use of a nasogastric tube in mild and moderate cases decreased after the Guidelines. The frequency of prophylactic use of antibiotics decreased with mild pancreatitis after publication of the Guidelines.

**Conclusions** Although it is difficult to attribute these changes to the direct influence of the Guidelines, several changes were observed in performance of clinical practices in accordance with recommendations of the Guidelines.

**Keywords** Acute pancreatitis · Clinical practice guidelines · Physicians' practice pattern · Questionnaire survey

## Introduction

Acute pancreatitis is a relatively common disease that occurs in 50 ~ 80 cases/100,000 population annually [1–8]. In recent years, the overall mortality rate of this disease has ranged from 2.9 to 7.8% in Japan [9–11]. However, the mortality rate of severe acute pancreatitis is more than 30% even today [12]. Therefore, improvement in its prognosis is an important problem that needs to be addressed. To improve the outcome of patients with acute pancreatitis, guidelines for its management have been drafted based on results from current clinical studies [13–16]. The Japanese Guidelines for the Management of Acute Pancreatitis [17] (hereafter, “Guidelines”), published in 2003, had a substantial impact on subsequent preparation of guidelines within the country.

Diffusion of effective treatments via guidelines is likely to have a major impact on patient outcomes. However, a number of studies have shown that guideline adherence is not necessarily satisfactory [18]. Without effective use, the presence of guidelines, even if its preparation required substantial manpower and expenses, would be meaningless. To examine the contents of current medical care with respect to the degree of guideline adherence, we conducted a questionnaire survey with members of three societies involved in the treatment of pancreatic diseases and abdominal emergency medical care. Furthermore, we examined changes in the treatment

of acute pancreatitis before and after publication of the Guidelines.

## Methods

We conducted a descriptive study using questionnaires with approximately 1,000 participants, including councilors and members of the Japanese Society of Abdominal Emergency Medicine, the Japan Pancreas Society, and the Japanese Society of Hepato-Biliary-Pancreatic Surgery. Participants were randomly selected from members of these societies at the rate of 1 of 3 members, and questionnaires were mailed together with a self-addressed return envelope. Details of the survey are shown in Table 1. Questions included diagnostic and treatment processes considered important in the management of acute pancreatitis in addition to demographic data, experience in medical care, and areas of specialty of respondents. First, we divided respondents by whether they had read the Guidelines or not. Respondents who replied “I read the text,” “I only read the recommendations,” and/or “I read the flow charts” were considered to have read the Guidelines. To document changes in clinical practice within these groups before and after publication of the Guidelines in July 2003 between the two groups, we compared the proportions of respondents who performed clinical practices in accordance with the Guidelines using Chi-square tests.

Next, we determined whether there were changes in clinical practices before and after publication of the Guidelines in each respondent. Based on changes before and after publication of the Guidelines, respondents were divided into the following three groups: those who did not perform the clinical practice in the past but who perform it now, those who performed the practice in the past but do not perform it now, and those for whom no changes were observed or who did not provide an answer. Differences in clinical practice changes between the two groups were examined using Mann–Whitney *U* tests.

Medical facilities in which chief physicians in charge of medical care were members of the societies were asked about the number of cases with acute pancreatitis that respondents handled over the period of 3 years between 2002 and 2004, as well as patient outcomes based on severity.

## Results

### Respondents

Of 1,000 society members to whom questionnaires were mailed, 590 responded (response rate, 59%). Respondents were divided into the following two groups based on their recognition of the Guidelines: (1) those who had read the Guidelines ( $N = 463$ ) and (2) those who had not read the

**Table 1** Recognition of the Guidelines and respondent characteristics

Item	Respondents who have read the Guidelines <i>N</i> (%)	Respondents who have not read the Guidelines <i>N</i> (%)	<i>P</i> value
Age (years)			
20–30	65 (22)	56 (21)	0.78
40–49	126 (43)	124 (46)	
50–59	73 (25)	71 (26)	
60–69	26 (9)	19 (7)	
Clinical practices setting			
University hospital	123 (42)	103 (38)	0.42
Designated hospital for clinical training	237 (81)	208 (76)	0.12
Clinical practices department			
Gastrointestinal medicine	56 (19)	19 (7)	<0.001
Other internal medicine	15 (5)	11 (4)	
Gastrointestinal surgery	142 (48)	127 (47)	
Other surgery	41 (14)	85 (31)	
Emergency care	21 (7)	6 (2)	
Others or no response	18 (6)	24 (9)	
Area of specialty			
Hepato-biliary pancreatic diseases	206 (70)	162 (60)	0.02
Case numbers for 3 years			
0 or no response	49 (17)	131 (48)	<0.001
<10 cases	136 (46)	113 (42)	
11–20 cases	60 (20)	17 (6)	
>21 cases	48 (16)	11 (4)	

Guidelines ( $N = 127$ ). Respondents who answered that they only read the recommendations and those who answered that they only read the flow charts were included in the group of respondents who read the Guidelines. Those who did not answer to the question were included in the group that did not read the Guidelines. Table 1 summarizes the details of the respondents. Of those that read the “Guidelines”, the proportion of respondents specializing in gastrointestinal diseases was high and that of general surgeons was low compared those who did not read the “Guidelines”. Also, the proportion of respondents specializing in hepato-biliary pancreatic diseases was significantly higher (70 vs. 60%;  $P = 0.02$ ) in the group that read the Guidelines. Respondents who had read the Guidelines also handled significantly more cases for 3 years.

#### Changes in the performance of medical care before and after publication of the Guidelines

Changes in performance of medical care before and after publication of the Guidelines are shown in Table 2. Changes were observed in diagnosis, severity assessment, treatment, nutrition support, and specific therapy. Before

publication of the Guidelines, there were more respondents who used amylase to diagnose acute pancreatitis than those who used lipase. However, following publication of the Guidelines, these numbers became almost equal between the groups. In contrast, frequency of the use of amylase in the assessment of severity decreased significantly, while its use for determination of severity scores increased significantly after publication of the Guidelines.

In treatment, use of a nasogastric tube in mild and moderate cases decreased after the Guidelines. The frequency of prophylactic use of antibiotics decreased with mild pancreatitis after publication of the Guidelines, although more than 40% of respondents replied that they used antibiotics for prophylactic purposes. In contrast, it was found that prophylactic antibiotics were in use in moderate and/or severe pancreatitis at a high proportion. Furthermore, the use of protease inhibitors decreased in mild pancreatitis cases after publication of the Guidelines, although no changes were observed in the proportion of its use in moderate and severe pancreatitis. With respect to  $H_2$  receptor antagonists, the proportion of their use increased in mild cases and decreased in moderate and severe cases after publication of the Guidelines (21 vs. 30%,  $P = 0.002$ ).

**Table 2** Changes in performance of clinical practices after publication of the Guidelines (all respondents)

Item	Before publication of the Guidelines N (%)	After publication of the Guidelines N (%)	P value
Diagnosis of acute pancreatitis			
Amylase	414 (97)	407 (96)	0.18
Lipase	268 (63)	320 (75)	<0.001
Decision on diagnosis			
Amylase	203 (52)	165 (41)	0.002
Lipase	121 (31)	191 (47)	<0.001
Severity assessment			
Amylase	116 (28)	91 (22)	0.045
Lipase	51 (12)	49 (12)	0.83
CRP	147 (36)	149 (36)	0.94
Severity score (either)	373 (90)	399 (96)	<0.001
Score of the Ministry of Health, Labour and Welfare	230 (56)	238 (57)	0.73
Contrast-enhanced CT	351 (83)	386 (91)	<0.001
Treatment			
Nasogastric tube (mild and moderate)	156 (38)	87 (21)	<0.001
Prophylactic antibiotic administration			
Mild	248 (59)	176 (43)	<0.001
Moderate	377 (91)	354 (86)	0.06
Severe	402 (98)	402 (99)	0.60
Protease inhibitors			
Mild	357 (86)	328 (80)	0.026
Moderate	404 (98)	397 (96)	0.222
Severe	408 (99.8)	411 (100)	0.499
H <sub>2</sub> receptor antagonists			
Mild	85 (21)	126 (30)	0.002
Moderate	351 (86)	307 (74)	<0.001
Severe	399 (98)	382 (92)	0.001
Nutrition			
Parenteral nutrition/enteral feeding (mild cases)	101 (25)	111 (28)	0.338
Enteral feeding (severe cases)	37 (9)	113 (28)	<0.001
Specific treatment for severe cases			
Selective digestive decontamination	85 (24)	128 (35)	0.001
Blood purification therapy	239 (66)	274 (74)	0.023
Intra-arterial infusion of protease inhibitors and antibiotics	259 (72)	295 (80)	0.012

Although no changes were observed in nutritional support (parenteral nutrition and enteral feeding) before and after publication of the Guidelines, the proportion of enteral feeding increased significantly in severe pancreatitis cases after publication (9 vs. 28%,  $P < 0.001$ ). An increase in the proportion of all forms of specific treatment was observed, including selective digestive decontamination (24 vs. 35%,  $P = 0.001$ ), blood purification therapy (66 vs. 74%,  $P = 0.02$ ), and intra-arterial infusion of protease inhibitors and antibiotics (72 vs. 80%,  $P = 0.01$ ).

#### Changes in performance of medical care and recognition of the Guidelines

The relationship between those who read the Guidelines or those who did not with changes in performance of medical care after publication of the Guidelines is summarized in Table 3. We first compared whether there was a difference in the proportion of respondents who read or did not read the Guidelines with respect to the performance of clinical practices prior to publication of the Guidelines.

**Table 3** Changes in performance of clinical practices before and after reading the Guidelines and changes before and after its publication

Item	Respondents who read the Guidelines (N = 463)				Respondents who have not read the Guidelines (N = 127)				P value
	Numbers of respondents	Baseline (%)	+	– (%)	Numbers of respondents	Baseline (%)	+	– (%)	
Diagnosis of acute pancreatitis									
Amylase	368	97.3	0	0.6	57	98.2	0	2.4	0.09
Lipase	368	64.1	11.4	1.1	57	56.1	2.4	0.8	0.06
Decision on diagnosis									
Amylase	368	51.6	0.2	6.9	57	51.9	0.0	4.7	0.43
Lipase	368	24.6	14.9	0.9	57	5.5	4.7	0.8	0.00
Severity assessment									
Amylase	360	26.9	0.2	4.8	53	35.8	0	2.4	0.29
Lipase	360	12.5	1.7	1.7	53	11.3	0	0	0.99
CRP	360	35.0	1.7	1.7	53	39.6	0	0	0.96
Severity score (either)	360	90.8	5.0	0.2	53	86.8	3.1	0	0.45
Score of the Ministry of Health, Labour, and Welfare	360	55.6	3.2	1.7	53	56.6	3.1	0	0.45
APACHE score	360	3.1	0.4	0.4	53	1.9	0	0	0.98
Contrast-enhanced CT	368	83.7	7.6	0.6	55	78.2	3.1	0.8	0.08
Treatment									
Nasogastric tube (mild and moderate)	362	36.7	1.9	14.5	54	42.6	1.6	8.7	0.13
Prophylactic antibiotic administration									
Mild	363	61.2	1.1	14.7	54	48.1	0	5.5	0.02
Moderate	364	90.4	2.4	5.6	52	92.3	1.6	3.1	0.53
Severe	360	97.5	0.9	0.2	51	100	0	0	0.48
Protease inhibitors									
Mild	360	87.2	0.9	6.3	55	78.2	0.0	0.8	0.05
Moderate	360	97.8	0.6	1.5	53	98.1	0.0	0.8	0.96
Severe	358	99.7	0.2	0.0	51	100	0.0	0.0	0.60
H <sub>2</sub> receptor antagonists									
Mild	360	21.1	11.2	5.2	49	23.5	4.9	2.0	0.42
Moderate	360	86.4	1.5	11.4	49	85.3	2.0	3.9	0.03
Severe	360	98.1	0.2	4.8	49	91.2	1.0	2.0	0.13
Nutrition									
Parenteral nutrition/enteral feeding (mild cases)*	363	21.8	3.5	0.9	54	52.6	2.0	0.0	0.76
Enteral feeding (severe cases)	364	9.6	16.0	0.2	51	2.9	2.9	0.0	0.00
Specific treatment for severe cases									
Selective digestive decontamination	318	23.3	9.1	1.3	42	22.2	0.0	0.0	0.87
Blood purification therapy	318	65.4	8.0	2.2	42	70.4	2.0	1.0	0.11
Intra-arterial infusion of protease inhibitors and antibiotics	318	73.0	7.6	2.4	42	66.7	3.9	2.9	0.32

Baseline shows the proportion of performance before and after publication of the Guidelines

+, Proportion of respondents who did not perform clinical practices before publication of the Guidelines but began after its publication

–, Proportion of respondents who performed clinical practices before publication of the Guidelines but discontinued after its publication

\* A significant difference ( $P < 0.05$ ) in the performance of clinical practices among those who read the Guidelines and those who did not

A significant difference was observed between the two groups only in the proportion of respondents who answered that they used lipase for decision on diagnosis (24.6 vs.

5.5%,  $P < 0.001$ ) and those who answered that they used parenteral nutrition or enteral feeding in mild pancreatitis cases (21.8 vs. 52.6%,  $P = 0.002$ ).

In contrast, significant differences were observed in the following items with respect to changes in performance of clinical practices before and after publication of the Guidelines: (1) lipase measurements for diagnostic decisions, (2) prophylactic antibiotic administration in mild cases, (3) prophylactic use of protease inhibitors in mild cases, (4) use of H<sub>2</sub> receptor antagonists in moderate cases, and (5) use of enteral feeding in severe cases. For those who read the Guidelines, the proportion of those who measured lipase to determine diagnosis was high before publication; the proportion of respondents who started measurements after publication was also high. No difference was observed between the two groups in the proportions of those who used antibiotics for mild cases and those who used H<sub>2</sub> receptor antagonists in moderate cases. However, the proportion of respondents who discontinued prophylactic use of antibiotics and H<sub>2</sub> receptor antagonists was high among those who read the Guidelines. There was no difference between groups with respect to the use of enteral feeding in severe cases, although the proportion of respondents who began enteral feeding was high among those who read the Guidelines. With respect to severity assessment, there was no difference in the use of any of the parameters between both groups before and after publication of the Guidelines.

## Discussion

In this study, we conducted a questionnaire survey with members of major societies in Japan who are involved in pancreatic disease treatment and abdominal emergency clinical practices. The response rate (59%) was relatively high. It is likely that respondents have many opportunities to get involved with patients with acute pancreatitis compared to non-respondents. Thus, respondents are likely to have a deep interest in the treatment of pancreatitis and care of patients afflicted with this disease. Accordingly, our results likely reflect a higher level of acute pancreatitis management than actually exists.

Our data demonstrated that acute pancreatitis management as recommended by the Guidelines is not adhered to as widely as expected. Almost all respondents replied that they measure amylase levels, while only 75% of the respondents measure lipase levels. It comes partly from the accessibility issues of lipase measurement in Japan that lipase is not measurable after and/or even in daily hours in some hospitals. Approximately 90% of respondents answered that they conduct contrast-enhanced CT, although the proportion of respondents who answered that they used the score system created by the Ministry of Health, Labour, and Welfare (MHLB) was less than 60%. The proportion of respondents who answered that they used CRP as the single marker for severity assessment was 36%. Although the

Guidelines recommend against the usage of a nasogastric tube, parenteral nutrition, and prophylactic antibiotics in mild cases, the proportion of respondents who used these was relatively high. Furthermore, while the Guidelines recommend that protease inhibitors be used only in severe cases, we found that they are widely used in patients irrespective of severity. Despite recommendations against the use of H<sub>2</sub> receptor antagonists based on severity, 92% of respondents indicated their use in 30% of mild cases, 74% of moderate cases, and up to 92% of severe cases.

Changes were also observed in the performance of clinical practices after publication of the Guidelines. A substantial portion of these changes occurred in accordance with its recommendations. With respect to the decision on diagnosis, measurement of amylase decreased (52 vs. 41%,  $P = 0.002$ ), whereas that of lipase increased (31 vs. 47%,  $P < 0.001$ ). The proportion of respondents who use contrast-enhanced CT for severity assessment increased (83 vs. 92%,  $P < 0.001$ ). With respect to individual treatment processes, use of a nasogastric tube in mild and moderate cases and administration of prophylactic antibiotics and protease inhibitors in mild cases decreased. Use of H<sub>2</sub> receptor antagonists decreased in mild cases and increased in moderate and severe cases. With respect to nutrition support, there were no changes in those who answered that they conduct parenteral nutrition or enteral feeding before or after publication of the Guidelines, while those who answered that they use enteral feeding in severe cases significantly increased (9 vs. 28%,  $P < 0.001$ ). The proportion of the use of specific treatments in severe cases increased in both forms of nutrition support after publication of the Guidelines.

Discussing the impact of the Guidelines on performance of clinical practices is generally difficult. In the present study, a variety of changes were observed in the performance of clinical practices before and after publication of the Guidelines, so the influence of secular trends as a factor responsible for the changes should be considered. Respondents were divided into two groups based on whether they read the Guidelines or not. No significant difference was found in the age of respondents and the medical facilities at which they work, potentially due to differences in their areas of speciality and the annual number of cases associated with their medical institutions. In contrast, a significant difference was observed between the two groups in the performance of some clinical practices' activities after publication of the Guidelines, while no difference was observed in the performance of others. These results suggest that only a few changes were observed in performance of clinical practices in accordance with recommendations of the Guidelines, but it is difficult to attribute these changes to the direct influence of the Guidelines. With respect to the number of respondents who have read the Guidelines, more specialize in gastrointestinal diseases compared to those

who have not read the Guidelines; the former also see patients with acute pancreatitis more frequently than the latter. Accordingly, those who have read the Guidelines are likely more frequently exposed to recent information on acute pancreatitis.

Reasons for lack of adherence to the Guidelines are diverse. According to a systematic review of articles by Cabana et al., 46 articles discussed “insufficient recognition of guidelines” and 31 discussed “unfamiliarity with the contents of guidelines” as factors that obstruct guideline adherence. Other factors mentioned were the “inability to agree with guidelines,” “lack of results to be expected by following guidelines,” “lack of ability to put into practice recommendations of guidelines,” “lack of volition,” and “inability to break habits.” External obstacles were “lack of patients’ agreement,” “presence of contents opposed to existing opinions,” “presence of restrictions by an organization or the medical system,” “not covered by medical insurance,” and “concerns about a possible increase in medical lawsuits” [18]. The rate of adherence to the Guidelines in the present study was by no means high. The following factors may have contributed to the low adherence rate in the present study: lack of knowledge about the Guidelines, inability to agree with contents of the Guidelines, and inability to break habits in clinical practices. We speculate that many of the non-respondents have no knowledge of or no interest in the Guidelines. With the exception of one item, there was no substantial change in performance of clinical practices even among those who read the Guidelines. Such a lack of change might be due to the inability to agree with contents of the Guidelines and inability to break habits in clinical practices. Changes in performance of clinical practices in accordance with recommendations observed among those who had not read the Guidelines suggest that clinical practices for acute pancreatitis are improving. These may come from the situations that brochures and handouts of the guidelines were distributed and symposiums of the Guidelines were taken place several times in many conferences.

## Conclusions

We found that the Guidelines are being read more frequently by physicians who specialize in gastrointestinal diseases and hepato-biliary pancreatic diseases, as well as those who treat patients with acute pancreatitis. An improvement in adherence rate was observed with respect to several clinical practices recommended by the Guidelines. Such an improvement in adherence was observed in physicians who had read the Guidelines and those who had not.

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