

ORIGINAL RESEARCH

Dietary therapy for patients with chronic pancreatitis in Japan: a cross-sectional online survey of physicians and registered dietitians

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Abstract

Background: This study was aimed towards understanding the current status of dietary therapy for patients with pancreatic exocrine insufficiency (PEI) in Japan and its alignment with Japanese recommendations for high-fat intake and concomitant high-potency pancreatic enzyme replacement therapy (PERT) by surveying treating physicians and registered dietitians.

Methods: The 19-item physicians' online questionnaire collected data about the number of patients with PEI treated, methods used to assess PEI and nutritional status in patients with PEI, as well as provision of dietary guidance and details of treatment with PERT. The 10-item registered dietitians' online questionnaire captured data about the provision of dietary guidance, including setting (inpatient or outpatient) and details of nutritional guidance provided to patients.

Results: Overall, 35 physicians and 23 dietitians completed the respective questionnaires. The primary cause of PEI in patients treated by physicians during the previous month was chronic pancreatitis (80.5%). Of 30 (86%) physicians who reported implementing dietary guidance for patients with PEI, less than half (43%) followed national guidelines and most (83%) implemented a

low-fat diet. The use of PERT in recently treated patients with PEI was low. Amongst 11 (48%) dietitians who reported providing dietary guidance to patients with chronic pancreatitis and PEI, 7 (64%) recommended restricting fat intake in patients with uncompensated chronic pancreatitis. Dietitians overall were more likely to provide guidance about alcohol avoidance (91%) than smoking cessation (48%) to appropriate patients.

Conclusion: This survey suggests that additional educational efforts are required to align the management practices of physicians and registered dietitians with evidence-based clinical practice guidelines for Japanese patients with chronic pancreatitis and PEI.

Keywords: chronic pancreatitis, cross-sectional survey, dietary therapy, Japan, pancreatic enzyme replacement therapy, pancreatic exocrine insufficiency.

Citation

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Introduction

Pancreatic exocrine insufficiency (PEI) is characterized by maldigestion and malabsorption of nutrients due to inadequate secretion of pancreatic enzymes.¹⁻⁵ The most frequent cause of PEI in adults is progressive chronic pancreatitis, although the condition can also develop as a consequence of other pancreatic diseases (acute necrotizing pancreatitis, pancreatic cancer) or after upper gastrointestinal surgery

(pancreatoduodenectomy, gastrectomy).⁴ As well as causing nutritional deficiencies, PEI is associated with an increased risk of sarcopenia, osteoporosis and cardiovascular events.²⁻⁵ Adequate treatment is therefore essential to minimize the detrimental effects of PEI on patient survival and quality of life.³⁻⁵

The clinical symptoms of PEI (e.g. steatorrhoea, weight loss, diarrhoea, abdominal pain and bloating) are frequently non-specific, are inconsistently and subjectively

reported, and overlap with those of other gastrointestinal conditions.^{1,4,5} PEI is diagnosed based on a combination of clinical symptoms, indicators of malnutrition and a non-invasive pancreatic function test in patients at risk.^{3–5}

Epidemiological studies conducted in Japan have shown a steady increase in the incidence and prevalence of chronic pancreatitis linked to lifestyle factors, such as alcohol use and smoking.^{6–8} In Japan, chronic pancreatitis is classified as compensated, transitional and uncompensated.⁵ In the compensated (mild-to-moderate) phase, enzyme output is lower than normal but is sufficient to prevent nutrient malabsorption. Prevention of relapse and pain is the priority. A low-fat diet to avoid symptoms associated with excessive pancreatic stimulation and pharmacotherapy, mainly with protease inhibitors, are recommended. The uncompensated phase is synonymous with 'end-stage chronic pancreatitis' as per a proposal for a mechanistic definition of chronic pancreatitis.⁹ Uncompensated or severe PEI is characterized by marked digestive and absorptive disorders and the presence of clinical steatorrhea. Patients with uncompensated PEI are often nutritionally depleted and require a high-fat, high-protein diet along with pancreatic enzyme replacement therapy (PERT) to maintain their nutritional status.⁵

Pancrelipase, a high-potency digestive enzyme preparation containing lipase, protease and amylase, was launched in Japan in 2011. Pancrelipase works in the same manner as endogenous digestive enzymes to stimulate digestion and absorption, allowing patients with PEI to tolerate high-fat diets.^{10,11} Pancrelipase has been shown to be effective and well tolerated in patients with PEI, with a potentially positive impact on nutritional status.¹² The 2021 Japanese Chronic Pancreatitis Clinical Practice Guidelines recommend that patients with PEI consume 40–70 g/day of fat along with high-potency digestive enzymes.⁵ Improvement and maintenance of nutritional status can be expected only if patients follow a diet appropriate to the phase of their disease.

A survey study conducted in 2008 to inform the development of guidance for chronic pancreatitis management in Japan found that more than half of responding physicians were not providing separate dietary guidance for the compensated and uncompensated phases of chronic pancreatitis nor specific guidance on lipid and calorie intake.¹³ After PERT was introduced in Japan, clinical practice guidelines were amended to state that patients with uncompensated chronic pancreatitis and PEI should consume a normal (not low-fat, not low-calorie) diet, along with PERT, in order to improve and maintain their nutritional status.¹⁴ To gain an understanding of the current status of dietary therapy for patients with

chronic pancreatitis and PEI, and to determine whether physicians' and dietitians' actual practice aligns with these recommendations, we considered it necessary to reassess the situation. This survey study of treating physicians and registered dietitians was conducted with the aim of constructing a profile of the current management approach to PEI in Japan as a step towards contributing to optimization of the nutritional management of these patients. The survey was specific to patients with chronic pancreatitis as the cause of PEI.

Methods

This survey of nutritional therapy in patients with chronic pancreatitis was conducted using customized purpose-designed web-based questionnaires sent to physicians and registered dietitians. Eligible for participation were physicians who treated at least one patient with chronic pancreatitis per month and registered dietitians who worked at a medical institution affiliated with a board-certified trainer of the Japan Pancreas Society (trainer category: chronic pancreatitis) or at a facility that employed at least one physician who treated at least one patient with chronic pancreatitis per month. Physicians and registered dietitians were recruited in two ways: specific targeting of individual clinicians (physicians, dietitians) known to the clinical research organization CMIC HealthCare Institute Co., Ltd. (Kumamoto, Japan), and general targeting via panel distribution of internal medicine, gastroenterology and endocrinology specialists and registered dietitians by Social Survey Research Information Co., Ltd. (Tokyo, Japan), a medical facility that provides research support to the CMIC HealthCare Institute.

Questionnaires

Questionnaires were distributed and completed electronically, and data were collected and aggregated, by Social Survey Research Information Co., Ltd. Before physicians proceeded to the main questionnaire, the web form captured basic background information about their professional situation. The 19-item physicians' questionnaire collected data about the number of patients with PEI treated, methods used to assess PEI, nutritional status in patients with PEI, provision of dietary guidance and details of treatment with pancreatic digestive enzyme drugs (Supplementary File 1; English translation; available at: <https://www.drugsincontext.com/wp-content/uploads/2023/07/dic.2023-2-4-Suppl.pdf>). The 10-item registered dietitians' questionnaire collected data about the provision of nutritional guidance for patients with chronic pancreatitis, including setting (inpatient or outpatient) and details of the

nutritional guidance provided to patients (Supplementary File 2; English translation; available at: <https://www.drugsincontext.com/wp-content/uploads/2023/07/dic.2023-2-4-Suppl2.pdf>).

Questionnaires were written and completed in Japanese language. Several sources were used to develop the questions. As a starting point, relevant questions about the provision of dietary guidance were repurposed from the 2008 'Report on preparation of abstinence from alcohol and life guidance guidelines for chronic pancreatitis'.¹³ Specifically, (1) Do you provide separate dietary guidance for the compensated and uncompensated phase of chronic pancreatitis? (2) Do you provide dietary guidance on fat intake? (3) Do you provide dietary guidance regarding calorie intake? For questions pertaining to the evaluation of nutritional status, items that are considered to be well measured in routine clinical practice (body mass index, albumin, haemoglobin, total cholesterol, >10% weight loss in previous 6 months and prealbumin) were identified from clinical study endpoints and malnutrition assessment criteria (GLIM criteria¹⁵). The daily dose of pancrelipase (as per the package insert) is 600 mg three times daily or 1800 mg/day (equivalent to 120,000–192,000 lipase units) but can be adjusted as appropriate for each patient. For questions relating to PERT, doses were described in total mg/day (e.g. 900 mg/day, 1800 mg/day), as generally referred to by physicians. Information on patient setting (inpatient or outpatient) in the dietitians' questionnaire was collected to determine whether outpatients receive the same nutritional management as inpatients. For questions where 'dietary supplements' was included amongst the responses, the term was not specified and could be interpreted by dietitians according to their

usual practice, which would include vitamins, mineral supplements, liquid protein drinks or similar.

Statistical analysis

Quantitative responses to questions were summarized by number counts and percentages. Qualitative responses to questions were categorized, and the total number of responses in each category was recorded.

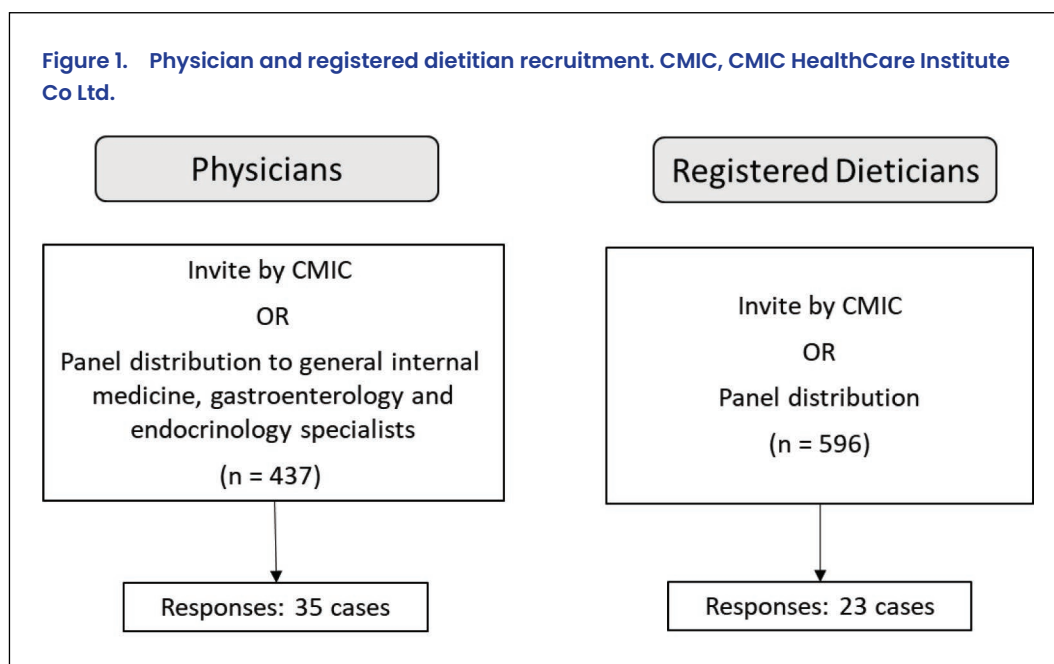
Ethical considerations

The survey was conducted in compliance with ethical principles set out in the Declaration of Helsinki and in accordance with the Ethical Guidelines for Medical and Health Research Involving Human Subjects.¹⁶ The survey is classified as 'research not utilizing human biological specimens' as specified in Chapter 4, Part 8, of the guidelines and does not necessarily require informed consent from individuals.

Results

The survey took place from 9 October 2020 to 25 January 2021. Physician and registered dietitian recruitment is shown in Figure 1.

Of 92 physicians invited by the CMIC HealthCare Institute to participate in the survey, 15 completed the questionnaire. An additional 345 physicians received the questionnaire via panel distribution, of whom 20 completed the questionnaire. Participating physicians were from the prefectures of Hokkaido/Tohoku, Kanto and Chubu ($n=6$ each), Kinki ($n=9$), Chugoku and Kyushu/Okinawa ($n=4$ each). Most physicians were gastroenterologists ($n=22$; 62.9%) or endocrinologists ($n=8$; 22.9%). Other



specialties represented were gastrointestinal surgery ($n=2$), gastroenterology/metabolism ($n=1$), hepatology ($n=1$) and internal medicine ($n=1$).

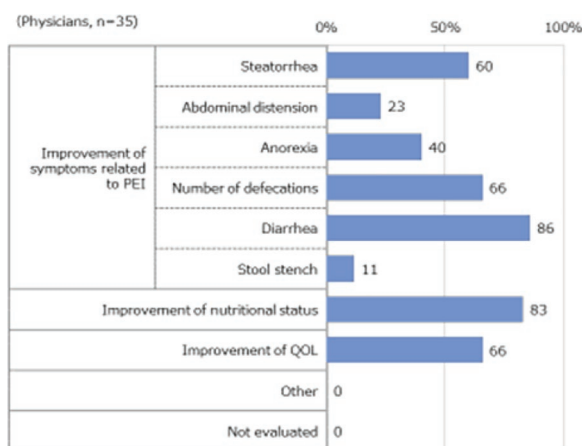
Of 92 registered dietitians invited by the CMIC Health-Care Institute to participate in the survey, 11 completed the questionnaire. An additional 504 registered dietitians received the questionnaires via panel distribution, of whom 12 completed the questionnaire.

Physicians' questionnaire

All participating physicians ($n=35$) reported having treated one or more patients with PEI during the previous month, most commonly one patient per month (37%), followed by two, three, or five patients per month (17% for each response), ≥ 10 patients per month (9%) and 6–9 patients per month (3%). The most common cause of PEI amongst recently treated patients was chronic pancreatitis (80.5%), followed by pancreatectomy (19.2%) and pancreatic cancer (1.7%).

The symptom considered by participating physicians to be most indicative of improvement in patients with PEI was diarrhoea (86%), followed by number of defecations (66%), steatorrhea (60%), anorexia (40%), abdominal distension (23%) and foul-smelling stool (11%). Most physicians considered that improvement of nutritional status (83%) and improvement of quality of life (66%) were important indicators of symptomatic improvement in patients with PEI (Figure 2).

Figure 2. Items regarded by participating physicians ($n=35$) as indicative of showing improvement in patients with pancreatic exocrine insufficiency (PEI). Numbers indicate the proportion of physicians selecting the response (multiple answers were allowed). QOL, quality of life. Questionnaires were written and completed in Japanese language.



All participating physicians (100%) reported using serum albumin concentrations to assess the nutritional status of patients with PEI, and 57% regarded serum albumin concentrations as the most important parameter in this respect. Weight loss of more than 10% in the past 6 months (89%), body mass index (71%) and total cholesterol (63%) were other criteria used by more than half of participating physicians to assess nutritional status in patients with PEI (Figure 3).

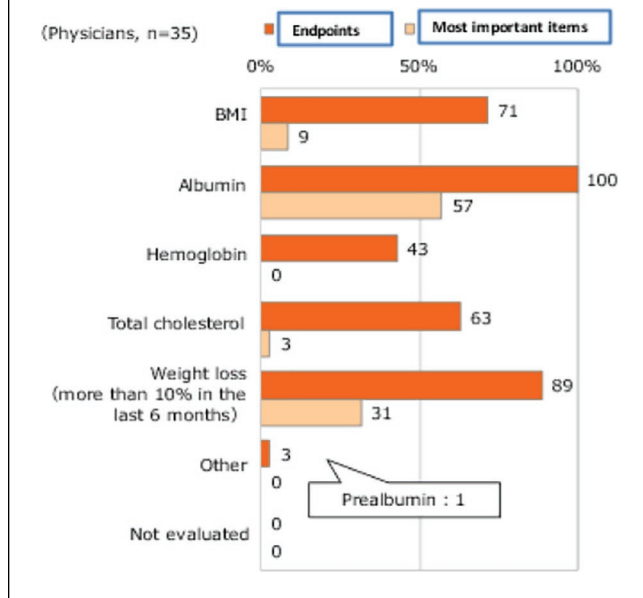
Most participating physicians (86%) reported using weight loss and the presence of steatorrhea (77%) to evaluate digestive and absorptive disorders in patients with PEI. Less than half of respondents (40%) reported using a pancreatic function diagnostic test for patient evaluation.

Most participating physicians ($n=30$; 86%) reported implementing dietary guidance for patients with PEI. Most of this group ($n=24$; 80%) indicated that nutritionists had primary responsibility for providing dietary guidance to patients with PEI, less so physicians themselves ($n=5$; 17%) or nurses ($n=1$; 3%). Amongst the 5 (14%) physicians who were not implementing dietary guidance for patients with PEI, reasons were diabetic complications ($n=2$), low food intake ($n=1$), compliance failure ($n=1$) and "eating habits and preferences do not change easily" ($n=1$).

Of the 30 physicians who were implementing dietary guidance for patients with PEI, fewer than half ($n=13$; 43%) reported following current evidence-based recommendations (e.g. Japanese Society of Gastroenterology dietary guidelines) regarding the provision of separate dietary advice for patients with compensated or uncompensated chronic pancreatitis. Amongst the 17 (57%) physicians who were not following recommendations about separate dietary advice, common reasons were difficulty in distinguishing between the compensated and uncompensated phases of chronic pancreatitis ($n=5$), inexperience with patients with PEI ($n=2$) or with PEI in general ($n=2$), and miscellaneous aspects of the dietary guidance ($n=4$) (Box 1).

The status of implementing dietary guidance on lipid and caloric intake is shown in Figure 4. Most of the 30 participating physicians who were implementing dietary guidance for patients with PEI reported using a low-fat diet ($n=25$; 83%). Four (13%) physicians reported implementing a normal diet (with no restriction on lipid ingestion), and 1 (3%) reported not providing patients with guidance on lipid intake "because we think it is difficult to continue". Most of the group reported implementing a diet with normal caloric intake ($n=25$; 83%); 3 (10%) reported implementing a low-calorie diet and 2 (7%) reported not providing guidance on caloric intake to patients because "we believe that a decrease in total calories leads to a decrease in activities of daily living"

Figure 3. Items used by participating physicians (n=35) to assess the nutritional status of patients with pancreatic exocrine insufficiency. Numbers indicate the proportion of physicians selecting the response (multiple answers were allowed). Questionnaires were written and completed in Japanese language.



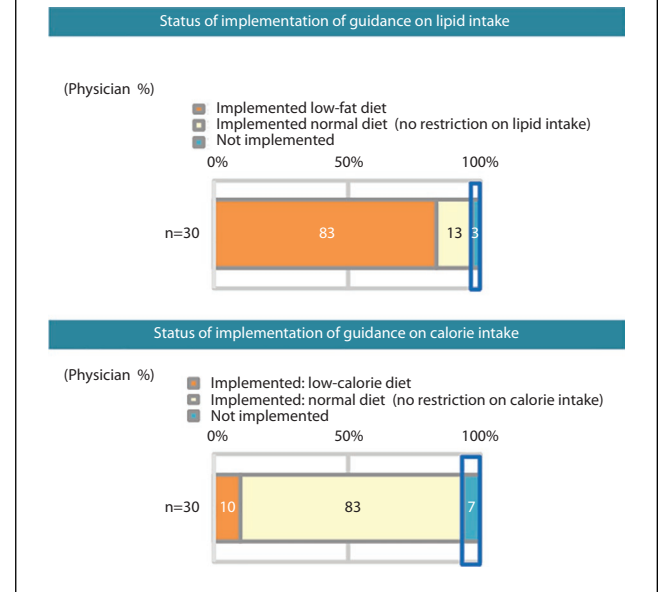
(n=1) or "it's tough to ask patients to even adjust their calories, so we only restrict fat" (n=1).

Across all 35 participating physicians, 39% of the total number of patients with PEI treated within the previous month had malnutrition. PERT had been prescribed to about one-quarter (24%) of patients with malnutrition.

Of the 24 physicians who reported prescribing PERT, more prescribed high-potency drugs (n=14; 57%) than low-potency drugs (n=8; 34%) or both high-potency and low-potency drugs (n=2; 8%). Reasons for using high-potency drugs were effectiveness (n=5), disease intractability (n=2) or institutional policy (n=5). Reasons for using low-potency drugs were the ability to adjust the dose according to medical condition (n=4), policy of gradual dose increase using low-potency drugs (n=2) and therapeutic sufficiency (n=2) (Box 2).

Amongst 20 physicians who were using high-potency PERT to treat patients with PEI, the most frequently prescribed dose was 1800 mg/day (55%), followed by 900 mg/day (28%), 2400 mg/day (7%), 3600 mg/day (5%), 3000 mg/day (5%) and 450 mg/day (0.5%). Amongst six physicians who were using both high-potency and low-potency PERT, the most frequently prescribed dose was 1800 mg/day (48%), followed by 900 mg/day (30%), 2400 mg/day (18%) and 3000 mg/day (3%).

Figure 4. Status of guidance on lipid intake and calorie intake amongst participating physicians who reported implementing dietary guidance to patients with pancreatic exocrine insufficiency (n=30). Numbers indicate the proportion of physicians selecting the response. Questionnaires were written and completed in Japanese language.



Physicians' (n=21) reasons for prescribing 900 mg/day, 1800 mg/day and higher doses of high-potency PERT drugs are summarized in Box 3. The 900 mg/day dose of PERT was prescribed mainly because of effectiveness (n=3) or issues with adherence/compliance at higher doses (n=3). The main reasons for prescribing a 1800 mg/day dose of PERT were standard treatment recommendations (n=3), capsule number precludes taking a higher dose (n=2), in accordance with the patient's clinical situation (n=2) or 'other' (n=2).

Dietitians' questionnaire

Of 23 registered dietitians who completed the questionnaire, 11 (48%) worked at a medical institution affiliated with a board-certified instructor of the Japan Pancreas Society and 12 (52%) worked in a healthcare facility that employed at least one physician who had treated ≥ 1 patient with PEI during the previous month.

About half (n=11; 48%) of participating registered dietitians reported providing dietary guidance to patients with chronic pancreatitis and PEI in both outpatient and inpatient settings, whereas fewer provided advice solely in outpatient (n=3; 13%) or inpatient (n=3; 13%) environments. Dietary guidance was provided most frequently at the request of a physician (n=16; 94%) and less frequently was self-initiated by the dietitian

Box 1. Physicians' reasons for not 'properly' following dietary guidance for patients with compensated (mild/moderate) or uncompensated (severe) chronic pancreatitis (n=17).

Comments	N
Category: Difficulty distinguishing between compensated and uncompensated phases of chronic pancreatitis	5
• I have difficulty distinguishing between the compensated and uncompensated phases	4
• I think it is complicated to distinguish between the compensated phase and the uncompensated phase	1
Category: Not dealing with uncompensated patients	2
• I don't work with uncompensated patients	2
Category: Inexperience	2
• I don't have that many patients	1
• I haven't made that many diagnoses	1
Category: Dietary intervention (miscellaneous)	4
• Early dietary intervention is also necessary to preserve pancreatic function	1
• I believe that adequate diet therapy is necessary even during the compensated phase	1
• I feel that the same meal content is fine	1
• The content of dietary guidance is provided by a dietitian	1
Category: Non-compliance with guidelines	1
• I can't comply with the details	1
Category: Other	1
• Because it is explained together with chronic pancreatitis	1
Category: No particular reason	2

Answers are in response to Q9 of the physicians' questionnaire: What are your reasons for not properly using different dietary guidance for patients with compensated chronic pancreatitis and patients with uncompensated chronic pancreatitis? Note: Questionnaires were written and completed in Japanese language.

(n=4; 24%). Amongst six registered dietitians (26%) who were not providing dietary guidance to patients with chronic pancreatitis and PEI at the time of the survey, it was because it had not been requested by a physician.

Of 17 (74%) registered dietitians who reported providing dietary guidance to patients with chronic pancreatitis and PEI, 5 (29%) had provided guidance to ≥ 3 patients, 3 (18%) to 2 patients, 3 (18%) to 1 patient, and 6 (35%) to no patients during the previous month. Most participating dietitians (n=23) reported providing alcohol abstinence guidance to patients who were suspected of consuming alcohol (n=21; 91%), of whom most (n=15; 65%) were active in both the outpatient and inpatient settings. Five (22%) dietitians provided alcohol abstinence guidance in outpatient clinics only, and 1 (4%) dietitian provided alcohol abstinence guidance to inpatients only. About half (n=11; 48%) of the 23 participating dietitians reported providing smoking cessation advice to patients with chronic

pancreatitis who were smokers, of whom most (n=9; 82%) were active in both the outpatient and inpatient settings.

Amongst 11 registered dietitians who reported having confirmed the use of digestive enzyme medication in patients with chronic pancreatitis and PEI, most (n=7; 64%) were active in the outpatient and inpatient settings, fewer in the inpatient setting only (n=2; 18%) or outpatient setting only (n=1; 9%), and 1 (9%) had made no enquiry. Most of these dietitians reported using serum albumin concentration (n=10; 91%), body mass index (n=10; 91%) and weight loss (n=10; 91%) as criteria to evaluate the nutritional status of patients with chronic pancreatitis. Serum albumin was considered the most important parameter in this regard.

For patients with compensated (mild/moderate) chronic pancreatitis, most (n=10; 91%) of the 11 registered dietitians who had provided dietary guidance within the previous month recommended restricting fat intake;

Box 2. Physicians' reasons for selecting high-potency or low-potency pancreatic enzyme replacement therapy drugs (n=25).

Comments	N
Category: Reasons to use high-potency drugs	12
Effectiveness	5
• Only the high titre [dose] is effective	2
• Low titre [dose] is not effective enough	2
• A high titre [dose] can be expected to improve pancreatic exocrine insufficiency due to the large number of unresectable pancreatic cancers	1
Intractability	2
• Because of intractability	2
Mainly using high titres [dose]	4
Other	1
• All prescribe pancrelipase	1
Category: Reasons to use low-potency drugs	8
Adjusting according to the medical condition	4
Policy of gradually increasing from low titre [dose]	2
Low titre [dose] is sufficient – no effect can be expected even if the amount is increased	2
Category: Other	5

Answers are in response to Q17 of the physicians' questionnaire: What are your reasons for prescribing pancreatic digestive enzyme drugs according to their potency? Note: Questionnaires were written and completed in Japanese language.

Box 3. Physicians' main reasons for prescribing 900 mg/day, 1800 mg/day and higher doses of high-potency pancreatic enzyme replacement therapy drugs (n=21).

Comments	N
Main prescription dose of 900 mg/day	7
Category: 900 mg/day dose is effective	3
• Even 900 mg can be expected to be more effective than conventional low titre	1
• Even 900 mg is relatively effective	1
• Many patients were changed to 900 mg when the supply temporarily decreased, and have maintained that dose since then	1
Category: Patient resistance/deterioration of medication compliance when taken in large doses	3
• Patients resist taking 12 capsules required for higher doses	1
• Patients say that taking 12 capsules is tough	1
• If you have a high dose, compliance will deteriorate	1
Category: Prescribing according to the patient's situation	2
• Prescribing according to the situation	1
• 900 mg of pancrelipase is used for patients with compensated chronic pancreatitis; 1800 mg of pancrelipase is used for patients with uncompensated chronic pancreatitis	1
Category: Follow-up at a lower dose	1

(Continued)

Box 3. Physicians' main reasons for prescribing 900 mg/day, 1800 mg/day and higher doses of high-potency pancreatic enzyme replacement therapy drugs (n=21). (Continued)

Comments	N
• I'm watching the patient's progress at a lower dose	1
Main prescription dose of 1800 mg/day	11
Category: Standard treatment recommendations	3
• According to the provisions of the package insert	1
• The dose is based on basic information	1
• 1800 mg/day is recommended as standard treatment	1
Category: Prescribing for patient compliance	2
• No patient can take more than 12 capsules	1
• A patient can't take more than this because the number of capsules is too large	1
Category: Prescribing according to the patient's situation	2
• Depends on the patient's situation	1
• Prescribe according to symptoms and data	1
Category: Medication compliance	1
• Prescribing for medication adherence	1
Category: Effectiveness	1
• Symptoms have subsided at 1800 mg/day	1
Category: Other	2
• For prescription with 600 mg × 3	1
• Increase from a small amount	1
Main prescription dose of 3600 mg/day	1
• Because a high titre [dose] is required	1
Main prescription doses of 900 mg/day and 1800 mg/day	1
• I prescribe a lot of 1800 mg/day	1
Main prescription doses of 1800 mg/day and 2400 mg/day	1
• There is often no change even if [the dose] is raised too much	1

Answers are in response to Q19 of the physicians' questionnaire: What are your reasons for prescribing higher doses of high-potency digestive enzyme drugs? Note: Questionnaires were written and completed in Japanese language.

3 (27%) recommended restricting energy intake and 3 (27%) recommended dietary supplementation. For patients with uncompensated (severe) chronic pancreatitis, 7 (64%) of the 11 dietitians recommended restricting fat intake, 3 (27%) recommended restricting energy intake and 3 (27.2%) recommended dietary supplementation (Figure 5).

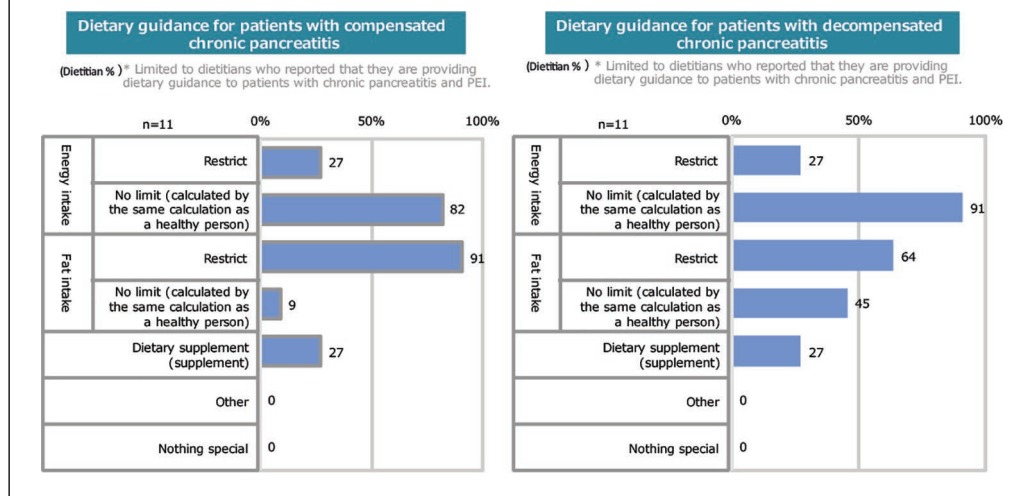
Amongst 11 registered dietitians who were providing dietary guidance, the most common educational source of dietary guidance for chronic pancreatitis was in-hospital study sessions (n=10; 91%). Six of these 11 (55%) dietitians continued to use in-hospital study sessions for ongoing educational purposes. Other educational sources of dietary guidance for chronic pancreatitis identified by

dietitians were out-of-hospital study sessions/seminars (n=9; 82%), university/graduate school (n=5; 45%), society (n=1, 9%) and others (e.g. Japanese Society for Clinical Nutrition and Metabolism; n=1; 9%). The number of dietitians who reported ongoing use of these latter sources for educational purposes was 8 (73%), 4 (36%), 1 (9%) and 1 (9%), respectively.

Discussion

In recognizing that restricting fat intake may be an obstacle to achieving and maintaining adequate nutritional status in patients with PEI, Japanese evidence-based clinical practice guidelines recommend that these patients

Figure 5. Dietary guidance for patients with compensated or uncompensated chronic pancreatitis by participating registered dietitians (n=11) who reported providing dietary guidance. Numbers indicate the proportion of dietitians selecting the response (multiple answers were allowed). Questionnaires were written and completed in Japanese language.



consume a normal amount of fat along with PERT as the cornerstone of PEI management.⁵ The same approach is advocated by expert groups in other world regions.²⁻⁴ To determine the level of adherence with these recommendations, we surveyed treating physicians and registered dietitians about their approach to dietary therapy for Japanese patients with chronic pancreatitis and PEI.

Participating physicians, mainly gastroenterologists or endocrinologists, reported that most of their PEI cases (approximately 80%) were due to chronic pancreatitis, consistent with the literature.³ Serum albumin (100%) and weight loss (89%) were the main criteria physicians used to assess nutritional status in patients with PEI. Most physicians (83%) regarded an improvement in nutritional status as a key indicator of symptomatic improvement in patients with PEI. Although most physicians (86%) reported having implemented dietary guidance for patients with PEI, 'proper' adherence to current dietary recommendations for the compensated and uncompensated stages of chronic pancreatitis was comparatively low. Notably, a large proportion (83%) of the 30 physicians who were implementing dietary guidance for patients with PEI were recommending a low-fat diet, albeit with normal calorie intake. Moreover, a low proportion (24%) of recently treated patients with PEI and malnutrition had been prescribed PERT. Our results align broadly with those of an international survey study that assessed the diagnosis and treatment of PEI in patients with chronic pancreatitis.¹⁷ Overall, 252 physicians experienced in the treatment of chronic pancreatitis participated in the survey; 56% were gastroenterologists and 80% were from Europe. Survey findings revealed a considerable lack of consensus and

substantial variation in clinical practice despite the availability of clinical practice guidelines. Notably, only 44% of respondents advised their patients to avoid dietary fat restriction and only 71% reported prescribing PERT in the presence of clinically evident steatorrhea. Together with our findings, there appears to be considerable scope for improving clinical practice such that it aligns with guideline recommendations for PEI management.

The difficulty in distinguishing between the compensated and uncompensated phases of chronic pancreatitis, as noted by several physicians, suggests that minimal progress has been made on this front since nutritional guidance status was first assessed in Japanese patients with chronic pancreatitis in 2008.¹³ A possible explanation for the lack of progress is the absence of a convenient in vitro diagnostic tool in Japan to stage chronic pancreatitis. The pancreatic function diagnostic test available for use in Japan (the N-benzoyl-L-tyrosyl-p-aminobenzoic acid [BT-PABA] test) is time consuming as it requires a 6-hour urine collection and is thus not favoured by physicians or patients. The faecal elastase 1 stool test is a simple and effective tool in wide use outside of Japan for the diagnosis of more advanced disease,¹⁸ however, it is not yet available to Japanese physicians.⁵

The surveyed registered dietitians (n=23) reported providing dietary guidance to patients with chronic pancreatitis almost exclusively at the request of a physician. About half of the participating dietitians who provided dietary guidance were active in both outpatient and inpatient settings, whereas fewer were active solely in one or the other environment. Although

sample sizes are too small to draw definitive conclusions, it appears that a reasonable proportion of outpatients are receiving nutritional management as part of their ongoing care. Similar to physicians, a considerable proportion (64%) of the 11 dietitians who had recently provided dietary guidance to patients with uncompensated (severe) chronic pancreatitis recommended restricting fat intake. Surveyed dietitians were much more likely to provide abstinence guidance to patients with chronic pancreatitis suspected of consuming alcohol than to provide cessation guidance for those who smoke. As excessive alcohol consumption and heavy smoking are both risk factors for developing chronic pancreatitis,^{5,19–21} additional education and supportive strategies are warranted to facilitate outreach to all patients at risk.

As the medical literature indicates, under-recognition and under-treatment of PEI in general are not unique to Japan.^{3,4,22} Our survey evaluated a specific aspect of PEI management, namely the provision of suitable dietary advice according to disease phase. Given the wide scope for improvement in broader aspects of PEI management (diagnosis, use of PERT), it is disappointing but not entirely unexpected that actual practice regarding the provision of specific dietary advice falls short of guideline recommendations.

The study has several limitations. As the number of physician and dietitian respondents was modest, the results may not accurately reflect the approach to PEI management throughout Japan. Because participants were recruited via email, it is possible that not all invitees were aware of the request (i.e. did not receive, read or take interest in the email), which may partly account for the low

respondent numbers. Moreover, the pool of registered dietitians meeting the requirements for participating in the survey was limited. Response bias, where individuals self-select for participation based on motivation or interest in the topic, and recall bias, where participants are required to recollect past behaviour, may also have influenced the results. An inherent limitation of a single-use, non-validated questionnaire is that some questions may not have been interpreted as intended. Not least, whilst all care and attention were taken to develop questions based on evidence and best practice recommendations, the possibility exists for a perception of bias.

Conclusions

Despite the availability of PERT in Japan for 10 years and corresponding revisions to guideline recommendations for the treatment of patients with chronic pancreatitis and PEI, it appears that the provision in clinical practice of separate dietary advice according to disease phase remains sub-optimal. Although our findings are not conclusive due to study limitations, they suggest a need for greater awareness of and education about chronic pancreatitis in general and about dietary therapy in particular. In our view, understanding the current status of dietary therapy in patients with PEI and physicians' reasons for not following current recommendations are first steps towards improving nutritional management in these patients. Enabling physicians to better distinguish between the compensated or uncompensated phases of chronic pancreatitis may be a critical factor in achieving this goal. Further research is required to more fully understand the status of dietary advice for Japanese patients with chronic pancreatitis and PEI.

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