


The barriers to interprofessional care for cancer cachexia among Japanese healthcare providers: A nationwide survey

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Abstract

Background Cancer cachexia is a severe complication of advanced malignancy, with few therapeutic options. To promote interprofessional care for cancer cachexia, healthcare providers' needs should be addressed in detail. This pre-planned subgroup analysis of the Global Educational Needs Evaluation: a systemic interprofessional study in cancer cachexia (GENESIS-CC) survey aimed to identify barriers to interprofessional care of cancer cachexia in Japan.

Methods A nationwide survey was electronically conducted for healthcare providers in oncological or general healthcare facilities from January to March 2021 in Japan. The Japanese Regional Advisory Board developed a barrier scoring system with 33 from the 58 original survey items to quantify six domains of barriers: (1) lack of confidence, (2) lack of knowledge, (3) barriers in personal practice, (4) barriers in perception, (5) barriers in team practice and (6) barriers in education. The largest possible barrier score was set at 100 points. We compared the scores by profession.

Results A total of 1227 valid responses were obtained from 302 (24.6%) physicians, 252 (20.5%) pharmacists, 236 (19.2%) nurses, 218 (17.8%) dietitians, 193 (15.7%) rehabilitation therapists and 26 (2.0%) other professionals. Overall, 460 (37.5%) were not very or at all confident about cancer cachexia care, 791 (84.1%) agreed or strongly agreed that care was influenced by reimbursement availability and 774 (81.9%) did not have cancer cachexia as a mandatory curriculum. The largest mean barrier score (\pm standard deviation) was 63.7 ± 31.3 for education, followed by 55.6 ± 21.8 for team practice, 43.7 ± 32.5 for knowledge, 42.8 ± 17.7 for perception and 36.5 ± 16.7 for personal practice. There were statistically significant interprofessional differences in all domains ($P < 0.05$), especially for pharmacists and nurses with the highest or second highest scores in most domains.

Conclusions There is a need to improve the educational system and team practices of cancer cachexia for most Japanese healthcare providers, especially pharmacists and nurses. Our study suggests the need to reform the mandatory educational curriculum and reimbursement system on cancer cachexia to promote interprofessional care for cancer cachexia in Japan.

Keywords cancer cachexia; medical education; need assessment; reimbursement; team practice

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Background

Cancer cachexia is a serious complication of advanced malignancy and a major cause of death in patients with cancer since the early 1900s.^{1,2} No standard medications have been strongly recommended by evidence-based guidelines globally.³ Although anamorelin hydrochloride was approved as the first specific medication for cancer cachexia in Japan,⁴ its effects on physical function, quality of life and overall survival have not been clearly indicated.^{5,6} A theoretical model of multimodal intervention was proposed for such complex conditions.⁷ However, few combined interventions have demonstrated tolerability and efficacy in randomized controlled studies.³ Because complete management of cancer cachexia may require medical, pharmacological, nutritional, rehabilitative and psychosocial support, it will be necessary to take an interprofessional approach.

Due to these limitations, many healthcare providers (HCPs) consider cancer cachexia an inevitable and irreversible condition in end-stage cancer and give low priority to cachexia care.⁸ A survey in 14 countries reported that most HCPs withheld supportive care until severe weight loss of >15%.⁹ Other surveys in Italy and Spain also found that approximately 40% of HCPs assessed nutritional status only at the patients' request.^{10,11} Nurses' awareness of cancer cachexia is also poor because it is not adopted in pre-graduate and postgraduate education curricula in many countries.¹² Moreover, many patients and caregivers are unaware of the term cachexia and its significance¹³ because HCPs provide little information about it.^{8,12–14} Consequently, they hesitate to report weight loss or anorexia to HCPs,^{12,13,15} and thus, cancer cachexia may be underdiagnosed or unnoticed.

Several surveys on the knowledge, awareness and practice of cancer cachexia among HCPs have been conducted in Japan,^{16,17} Spain,¹¹ Italy,¹⁰ the United States,¹⁸ Australia and New Zealand,¹⁹ and multinational groups.⁹ However, it is difficult to directly compare each report for the following reasons. First, the researchers used different original questionnaires based on the individual focus on various aspects of cancer cachexia. This inconsistency may have limited the comparability of the surveys. Second, most surveys were conducted among HCPs in designated or specialized cancer treatment facilities.^{9,10,17–19} Few surveys have targeted HCPs managing patients with cancer in general medicine or home care facilities.^{11,16} Similarly, most surveys included medical oncologists, dietitians and nurses specializing in oncology,^{9–11,17–19} while a few have included other professionals involved in interprofessional cachexia care, including pharmacists, rehabilitation therapists, psychotherapists or social workers.^{11,16,17,19} Finally, most surveys were weighted towards domains in knowledge, awareness and personal practice,^{9,11,17,18} with a few surveys simultaneously asking balanced questions about confidence, team practice and education.^{10,17,19} These limited

perspectives make it difficult to see the impact of cancer cachexia care on the overall healthcare system.

In light of the current situation, the Society on Sarcopenia, Cachexia, and Wasting Disorders (SCWD) launched a project for establishing future international educational programmes for cancer cachexia, named the Global Educational Needs Evaluation: a systemic interprofessional study in cancer cachexia (GENESIS-CC). The first survey was conducted in multiple international societies, in Europe, North America and Japan. The researchers obtained 2375 evaluable responses and reported large barriers to the knowledge and practice of cancer cachexia in HCPs worldwide.²⁰ However, it is difficult to apply the survey results to all countries because there are significant international differences in specialist availability, interprofessional collaboration methods, approved medical care and medical education systems. We can only suggest specific countermeasures by conducting detailed barrier analysis for each medical region. In addition, different professions have different educational systems and medical practice authorities and, therefore, different roles to play in interprofessional cachexia care.²¹

Accordingly, we pre-planned a subgroup analysis of Japanese respondents in the GENESIS-CC survey. This analysis aimed to identify barriers to interprofessional care for cancer cachexia and compare them by profession among Japanese HCPs.

Methods

Survey design and questionnaires

The detailed survey design has been reported in a previous study.²⁰ We established a comprehensive questionnaire based on an up-to-date literature review and focus group interviews conducted under the leadership of the SCWD, with the cooperation of relevant societies in North America, Europe and Japan. The final questionnaire consisted of 58 multiple-choice Likert scales or free response items (*Table S2*). The estimated online completion time was 20 min. The questionnaire consisted of respondent demographics (10 items), knowledge domain/defining cachexia (5 items), knowledge domain/assessing risk (2 items), practice domain/screening (5 items), practice domain/diagnosing (5 items), practice domain/treating (9 items), attitude domain/perception (7 items), interprofessional practice (5 items), facilitators and barriers (4 items) and education (6 items). The survey was designed in English, French, German, Italian, Spanish and Japanese. The finalized survey was disseminated electronically using SurveyMonkey® from 18 January 2021 to 14 May 2021 throughout Japan, Europe and North America.

Survey framework in Japan

The Japanese Regional Advisory Board (RAB) conducted a nationwide survey of HCPs in oncological and general healthcare facilities. The survey was expanded through official collaborations with academic societies in Japan, following a specific process. Initially, the Japanese RAB identified seven clinical fields related to cancer cachexia, which included supportive/palliative care in cancer, clinical oncology, nutrition science, nursing science, clinical pharmacology, frailty and sarcopenia, and rehabilitation medicine. Subsequently, 20 potential domestic academic societies were compiled, with more than two societies identified for each field. Requests for official collaboration were then extended to the respective society executives. Finally, the following 14 organizations accepted the invitation for official collaboration: (1) Japanese Society for Palliative Medicine; (2) Japanese Society of Metabolism and Clinical Nutrition; (3) Japanese Society of Clinical Nutrition; (4) Japanese Association of Supportive Care in Cancer; (5) Japanese Society of Cancer Nursing; (6) Japanese Society for Pharmaceutical and Palliative Care and Sciences; (7) Japanese Hospital Pharmacist Association; (8) Japanese Society of Pharmaceutical Oncology; (9) Japanese Association on Sarcopenia and Frailty; (10) Japanese Association of Rehabilitation Nutrition; (11) Japanese Association of Cancer Rehabilitation; (12) Japanese Society for Sarcopenia, Cachexia, and Wasting Disorders; (13) Japanese Pharmaceutical Association; and (14) Japanese Society of Physical Therapy Section of Oncology. The survey was distributed through their official websites, newsletters and social media channels.

We pre-planned a subgroup analysis and publicly registered it (clinical registry number: UMIN000043030) on 16 January 2021. The final Japanese questionnaire was disseminated electronically using SurveyMonkey® from 18 January 2021 to 10 March 2021 in Japan. Completion of the survey by HCPs was encouraged through the society websites, newsletter, email and social media with a response form link by Japanese RAB members. All data were confidentially collected and rendered anonymous by removing IP addresses. Following the survey, data were downloaded from SurveyMonkey® and analysed. Responses that were incomplete beyond the self-reported confidence items were removed from the original file and were not included in the analysis.

Grading and scoring system

Japanese RAB members developed a barrier grading and scoring system with 33 of 58 survey items to quantify care barriers and compare them by profession (Tables S1 and S2). First, we set up the following six barrier domains: (1) lack of confidence, (2) lack of knowledge, (3) barriers in personal practice, (4) barriers in perception, (5) barriers in team practice and (6) barriers in education. Second, we reviewed the

questions and choices in each domain and defined a barrier response pattern for each question as (1) incorrect responses based on current scientific evidence or (2) responses that indicated an important challenge in the interprofessional care of cancer cachexia. Third, questions were excluded if they were difficult to define with obvious barrier response patterns or if they were restricted to specific professionals. In this process, 25 questions were excluded from the original questionnaire. The proportion (percentage) of responses identified as barrier responses was described and graded into five levels: Grades 0 (<10%), 1 (10 to <25%), 2 (25 to <50%), 3 (50 to <75%), 4 (75 to <90%) and 5 (>90%). Finally, we set a 100-point scoring method for each of the six barrier domains (Table S1).

Statistical analysis

Continuous variables were described as mean \pm standard deviation (SD) or median with range, if appropriate. Responses to the choices were described in the actual number of respondents, proportion in percentage and barrier grading. Missing or inapplicable values were excluded from the denominator when calculating the proportion. All variables were compared among the five professions: (1) physicians, (2) dietitians, (3) nurses, (4) pharmacists and (5) rehabilitation therapists, including physical, occupational and speech therapists. The other professionals were grouped as 'others'. We used the χ^2 test or Fisher's exact test to compare categorical variables and the Wilcoxon rank-sum test to compare continuous or ordinal variables. For all analyses, statistical significance was set at $P < 0.05$. All statistical analyses were performed using JMP Version 13.0 for Windows (SAS Institute Inc., Cary, NC, USA).

Results

Participant demographics

Data were collected from 1407 Japanese respondents out of 2705 global respondents who completed the demographic sections of the survey (Figure 1). We excluded 180 responses, leaving 1227 for analysis: 179 did not continue the survey following the survey item assessing self-reported confidence, and 1 lacked precision in data (e.g., age was entered as 1 year old, and most questions were not answered) based on the decision of the Japanese RAB.

Female respondents were 51.7%, with a significant difference in sex distribution by profession; the majority of dietitians and nurses were women, while most physicians and rehabilitation therapists were men (Table 1). The median age was 44 years (range 25–75). One quarter ($n = 302$, 24.6%) of the respondents were physicians, followed by pharmacists

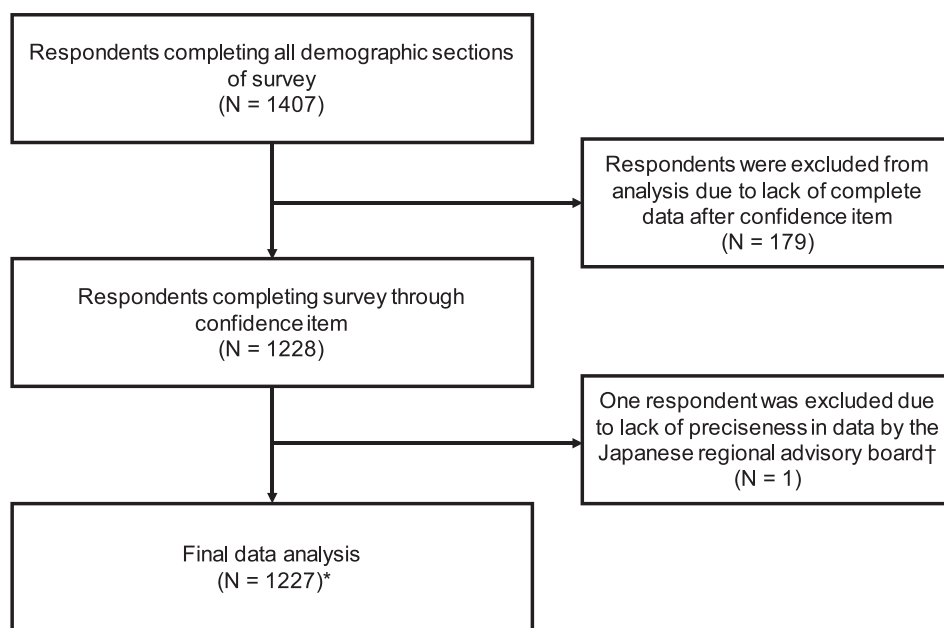


Figure 1 Data cleaning for Japanese subgroup analysis. *Respondent dropout over survey noted in tables as missing data. †The respondent was excluded due to a lack of precision in data based on the decision of the Japanese Regional Advisory Board.

($n = 252$, 20.5%), nurses ($n = 236$, 19.2%), dietitians ($n = 218$, 17.8%), rehabilitation therapists ($n = 193$, 15.7%) and others ($n = 26$, 2.0%). The others included dentists or dental hygienists ($n = 10$), teachers ($n = 6$), psychotherapists ($n = 4$), medical assistants ($n = 3$), social workers ($n = 2$) and biostatistician ($n = 1$). The most common specialty was palliative and supportive care, with one third of the physicians and nurses involved in it. Approximately 30% of physicians were surgeons or medical oncologists. Other professionals were primarily involved in general medicine. The median experience as an HCP was 19 (0–57) years. The median experience with cancer cachexia care was 10 (0–50) years, with physicians, nurses and dietitians having a median experience of ≥ 10 years. Public hospitals, academic medical centres and private hospitals accounted for nearly 70% of the primary practice locations, whereas cancer centres accounted for 6.0% of it. Notably, 14.7% of the pharmacists were dispensing pharmacists, 8.5% of nurses were visiting nurses and 2.6% of rehabilitation therapists were visiting rehabilitation personnel.

Lack of confidence

Approximately a quarter (25.2%) of the respondents were very or somewhat confident in their ability to provide care for patients at risk of or diagnosed with cancer cachexia. Meanwhile, over one third (37.5%, Grade 2) of the respondents were not very or at all confident, which we defined as a barrier score for the lack of confidence domain (Tables 1 and S1). Pharmacists (59.9%, Grade 3) had the highest lack of confidence scores, followed by nurses (43.6%, Grade 2), re-

habilitation therapists (39.9%, Grade 2), dietitians (29.4%, Grade 2) and physicians (17.2%, Grade 1), with statistically significant interprofessional differences (Figure 2).

Lack of knowledge

Respondents who chose a value different from the standard diagnostic criteria for cancer cachexia or who did not know the criteria were 34.6% (Grade 2) for the weight loss cut-off and 56.7% (Grade 3) for the body mass index (BMI) cut-off (Table 2). Additionally, 39.9% (Grade 2) of the respondents were unable to select the four main causes of weight loss, which were reduced oral intake, progressive disease, inflammation and toxicity of chemotherapy (Table S2). Nurses and pharmacists were in the worst or second worst position in all questions of the lack of knowledge domain with statistically significant interprofessional differences. The mean \pm SD of lack of knowledge on a 100-point scale was 43.7 ± 32.5 (Table 2 and Figure 2).

Barriers in perception

The majority (65.9%, Grade 3) of the respondents recognized that cancer cachexia was unavoidable (Table 3). Only a few (<10%, Grade 0) misperceived that an interprofessional team approach and weight management were not important in cancer cachexia care. There were no interprofessional differences in the perception items. However, there were significant interprofessional differences among the following three items. More than two thirds, especially pharmacists and

Table 1 Participant demographics

	All	Physicians	Dietitians	Therapists	Nurses	Pharmacists	Others	P-value ^a
<i>n</i>	1227	302	218	193	236	252	26	
Age	44 (25–75)	50 (29–70)	44 (26–68)	37 (25–61)	46 (27–64)	40 (26–66)	49.5 (31–67)	<0.0001
Gender	634 (51.7)	64 (21.2)	186 (85.3)	51 (26.4)	220 (93.2)	96 (38.1)	17 (65.4)	<0.0001
	588 (47.9)	236 (78.1)	32 (14.7)	142 (73.6)	15 (6.4)	155 (61.5)	8 (30.8)	
	5 (0.4)	2 (1.0)	0	0	1 (0.4)	1 (0.4)	1 (0.4)	
Speciality	222 (18.1)	87 (28.8)	3 (1.4)	4 (2.1)	92 (39.0)	35 (13.9)	1 (3.8)	<0.0001
	115 (9.3)	41 (13.6)	15 (6.9)	18 (9.3)	14 (5.9)	26 (10.3)	1 (3.8)	
	64 (5.2)	0	0	0	61 (25.8)	0	3 (11.5)	
	59 (4.8)	54 (17.9)	2 (0.9)	1 (0.5)	2 (0.8)	0	0	
	59 (4.8)	12 (4.0)	1 (0.5)	45 (23.3)	0	0	1 (3.8)	
	28 (2.3)	1 (0.3)	25 (11.5)	0	0	1 (0.4)	1 (3.8)	
	22 (1.8)	13 (4.3)	4 (1.8)	3 (1.6)	2 (0.8)	0	0	
	21 (1.7)	18 (6.0)	0	2 (1.0)	0	1 (0.4)	0	
	11 (1.0)	5 (1.7)	2 (0.9)	2 (1.0)	2 (0.8)	0	0	
	11 (1.0)	11 (3.6)	0	0	0	0	0	
	10 (1.0)	4 (1.3)	2 (0.9)	0	0	2 (0.8)	2 (7.7)	
	10 (1.0)	10 (3.3)	0	0	0	0	0	
	78 (6.4)	33 (10.9)	6 (2.8)	9 (4.7)	13 (5.5)	9 (3.6)	8 (30.8)	
	517 (42.1)	13 (4.3)	158 (72.5)	109 (56.5)	50 (21.2)	178 (70.6)	9 (34.6)	
Total years of experience as a healthcare provider	19 (0–57)	25 (3–46)	19 (2–57)	12 (2–38)	22 (4–43)	16 (3–40)	15.5 (0–42)	<0.0001
Number of years treating cancer patients with cachexia	10 (0–50)	17.5 (0–50)	10 (0–34)	5 (0–21)	14 (0–35)	6 (0–35)	4 (0–24)	<0.0001
Primary practice location								<0.0001
Public hospital	319 (26.0)	84 (27.8)	74 (33.9)	44 (22.8)	48 (20.3)	65 (25.8)	4 (15.4)	
Academic medical centre	268 (21.8)	84 (27.8)	48 (22.0)	39 (20.2)	48 (20.3)	42 (16.7)	7 (26.9)	
Private hospital	265 (21.6)	71 (23.5)	41 (18.8)	64 (33.2)	31 (13.1)	55 (21.8)	3 (11.5)	
Comprehensive cancer centre	74 (6.0)	16 (5.3)	8 (3.7)	11 (5.7)	23 (9.7)	13 (5.2)	3 (11.5)	
Pharmacy	37 (3.0)	0	0	0	0	37 (14.7)	0	
Home care station	28 (2.3)	2 (0.7)	1 (0.4)	5 (2.6)	20 (8.5)	0	0	
Geriatric/rehabilitation centre	13 (1.1)	0	2 (0.9)	6 (3.1)	3 (1.3)	1 (0.4)	1 (3.8)	
Multispecialty group practice	5 (0.4)	0	0	0	3 (1.3)	2 (0.8)	0	
Solo practice	5 (0.4)	0	3 (1.4)	1 (0.5)	1 (0.4)	0	0	
Other	213 (17.4)	45 (14.9)	41 (18.8)	23 (11.9)	59 (25.0)	37 (14.7)	8 (30.8)	<0.0001
Confidence in ability to care for patients at risk or diagnosed with cachexia								
Very confident	28 (2.3)	17 (5.6)	2 (1.0)	4 (2.1)	1 (0.4)	3 (1.2)	1 (3.8)	
Somewhat confident	281 (22.9)	114 (37.7)	57 (26.1)	31 (16.1)	42 (17.8)	34 (13.5)	3 (11.5)	
Neutral	458 (37.3)	119 (39.4)	95 (43.6)	81 (42.0)	90 (38.1)	64 (25.4)	9 (34.6)	
Not very confident	362 (29.5)	43 (14.2)	54 (24.8)	67 (34.7)	55 (36.0)	104 (41.3)	9 (34.6)	
Not at all confident	98 (8.0)	9 (3.0)	10 (4.6)	10 (5.2)	18 (7.6)	47 (18.7)	4 (15.4)	
Barrier score	Lack of confidence (not very or not at all confident)	460 (37.5) ^b	52 (17.2)	64 (29.4)	77 (39.9)	151 (59.9)	13 (50.0)	<0.0001
		Gr 1	Gr 2	Gr 2	Gr 2	Gr 3	Gr 3	

^aInterprofessional differences were tested by the χ^2 test or Wilcoxon's test.

^bNumber (%) of barrier response and Grade (Gr) were shown.

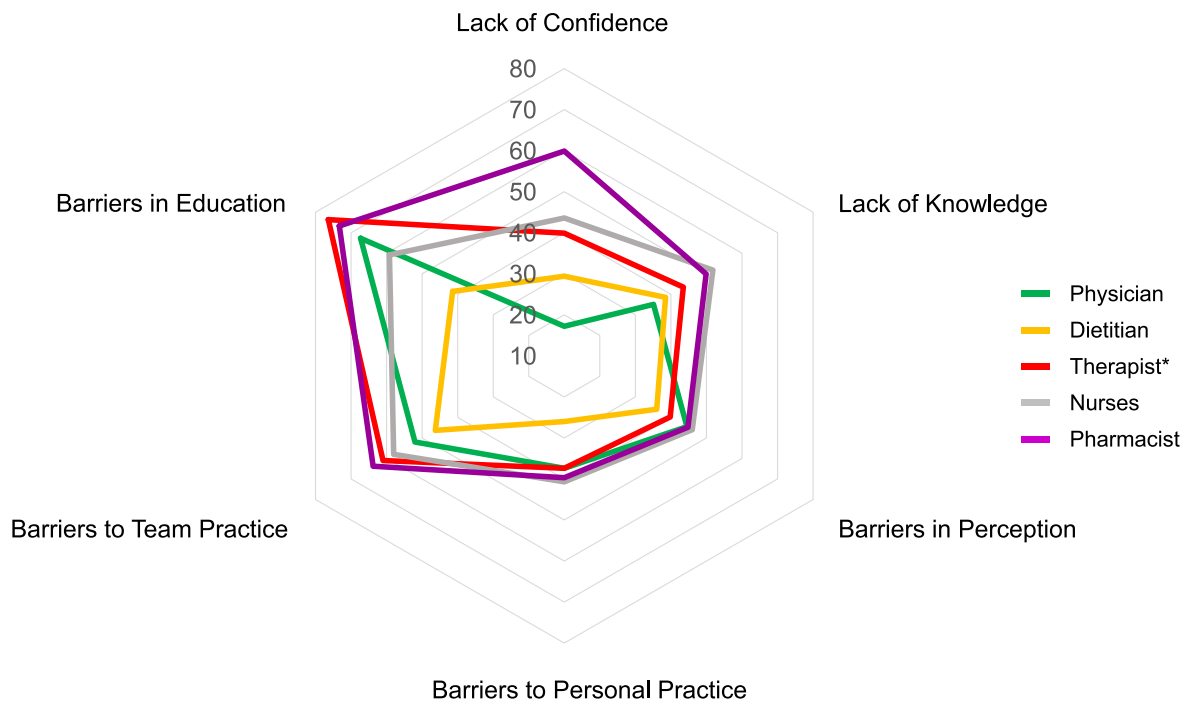


Figure 2 Barrier scores by profession. The proportion of respondents who were not very or not at all confident in cancer cachexia care or mean barrier scores (0–100 points) was plotted by profession. *Rehabilitation therapists included physical, occupational and speech therapists.

nurses, perceived lack of evidence for care (70.3%, Grade 3) and effective medications (75.9%, Grade 4) as challenges to their practice in cancer cachexia. In addition, there was insufficient time to provide psychological care to patients and their families (68.4%, Grade 3), especially for physicians and nurses (Grades 4 and 3, respectively). The mean \pm SD of barriers in perception on a 100-point scale was 42.8 ± 17.7 (Table 3 and Figure 2).

Barriers in personal practice

Screening for weight loss

Overall, the vast majority of respondents (92.8%) recognized that weight screening was necessary regardless of the degree of weight loss, but the majority (60%, Grade 3) did not actually screen it at each visit (Table 4). Moreover, weight tracking had Grade 2 barriers in practice.

The HCP in charge of weight loss screening was unclear in 14.9% of the cases (Grade 1). Nurses were responsible for weight loss screening in nearly half of the cases. The main reasons for not routinely screening patients for weight loss were that they did not know how to effectively do it (42.2%), there were no standardized tools or instruments (36.7%), it was not a priority (33.3%) and the belief that weight loss is an expected side effect of treatment (23.7%). The respondents also identified barriers in the healthcare system for screening cancer cachexia. These barriers included screening not being a regulatory priority (24.3%), insufficient

personnel or fiscal resources available to screen patients (20.5%) and no cue to screen (e.g., required field in medical records that must be completed: 19.6%). Finally, respondents reported that they did not regularly screen for cachexia because they did not have medical resources (11.0%) or curative treatment options (16.5%) if cachexia was diagnosed.

Diagnosing cancer cachexia

Nearly half of the respondents (52.0%, Grade 3) reported that little to no attention was given to the diagnosis of cancer cachexia, especially by nurses and pharmacists with lower attention (Grade 3; Table 4). The questionnaire asked about the following six essential actions for diagnosing cancer cachexia: (1) identifying the presence of anorexia and decreased oral intake; (2) evaluating inflammatory markers; (3) evaluating physical functions; (4) collecting clinical and laboratory data; (5) determining calorie and protein requirements; and (6) measuring body composition (Table S2). Overall, 14% (Grade 1) of respondents indicated that these essential items of diagnosis were not practised or were unknown, with the lowest barrier grade in physicians (7.2%, Grade 0), showing a statistical difference by profession.

Treating cancer cachexia

Questionnaire consisted of the following seven essential treatment options for cancer cachexia: (1) recommend oral nutritional supplements, (2) incorporate energy and protein-fortified foods in the diet, (3) prescribe nutritional counselling, (4) prescribe corticosteroids, (5) prescribe physi-

Table 2 Lack of knowledge

Barriers	All	Physicians	Dietitians	Therapists	Nurses	Pharmacists	Others	P-value ^a
No. of evaluable response	1227	302	218	193	236	252	26	
Misunderstanding of diagnostic criteria	424 (34.6) ^b	83 (27.5)	60 (27.5)	64 (33.2)	104 (44.1)	100 (39.7)	13 (50.0)	<0.0001
		Gr 2	Gr 2	Gr 2	Gr 2	Gr 2	Gr 3	
Cut-off in BMI	696 (56.7)	149 (49.3)	113 (51.8)	97 (50.3)	169 (71.6)	149 (59.1)	19 (73.1)	<0.0001
		Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	
Unaware of pathophysiology (4 items)	490 (39.9)	86 (28.5)	79 (36.2)	91 (47.2)	94 (39.8)	128 (50.8)	12 (46.2)	<0.0001
		Gr 2	Gr 2	Gr 2	Gr 2	Gr 3	Gr 2	
Barrier score	43.7 ± 32.5 ^c	35.1 ± 29.7	38.5 ± 31.2	43.5 ± 32.5	51.8 ± 33.1	49.9 ± 33.2	56.4 ± 30.9	<0.0001

Abbreviation: BMI, body mass index.

^aIn interprofessional differences were tested by the χ^2 test or Wilcoxon's test.

^bNumber (%) of barrier response and Grade (Gr) were shown.

^cMean ± standard deviation of barrier score was shown.

Table 3 Barriers in perception

Barriers	All	Physicians	Dietitians	Therapists	Nurses	Pharmacists	Others	P-value ^a
No. of evaluable response	1227	302	218	193	236	252	26	
Misperception of cachexia	652 (65.9) ^b	191 (71.0)	101 (58.7)	91 (66.4)	130 (66.3)	130 (65.3)	9 (52.9)	0.1292
		Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	
Unavoidability	65 (6.6)	16 (6.0)	9 (5.2)	8 (5.8)	18 (9.2)	14 (7.0)	0	0.5619
		Gr 0	Gr 0	Gr 0	Gr 0	Gr 0	Gr 0	
Effect on obesity patient	40 (4.0)	14 (5.2)	5 (2.9)	3 (2.2)	9 (4.6)	9 (4.5)	0	0.5693
		Gr 0	Gr 0	Gr 0	Gr 0	Gr 0	Gr 0	
Misperception of need in cachexia care	54 (5.5)	19 (7.1)	6 (3.5)	5 (3.7)	16 (8.2)	8 (4.0)	54 (5.5)	0.1382
		Gr 0	Gr 0	Gr 0	Gr 0	Gr 0	Gr 0	
Standard weight evaluation tools	683 (70.3)	187 (69.5)	97 (58.1)	91 (66.9)	145 (76.7)	154 (78.6)	9 (64.3)	0.0001
		Gr 3	Gr 3	Gr 3	Gr 4	Gr 4	Gr 3	
Lack of evidence to guide the care	710 (75.9)	203 (75.8)	92 (64.8)	84 (67.2)	156 (82.5)	168 (84.4)	7 (58.3)	<0.0001
		Gr 4	Gr 4	Gr 3	Gr 4	Gr 4	Gr 3	
Lack of safe and effective medications	677 (68.4)	204 (75.8)	91 (52.9)	92 (67.2)	144 (73.5)	137 (68.8)	9 (52.9)	<0.0001
		Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	
Lack of time for psychosocial support	42.8 ± 17.7 ^c	44.5 ± 17.1	36.0 ± 18.7	39.8 ± 17.7	46.0 ± 17.1	44.8 ± 15.7	33.3 ± 26.1	<0.0001
		Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	
Barrier score	42.8 ± 17.7 ^c	44.5 ± 17.1	36.0 ± 18.7	39.8 ± 17.7	46.0 ± 17.1	44.8 ± 15.7	33.3 ± 26.1	<0.0001

^aIn interprofessional differences were tested by the χ^2 test or Wilcoxon's test.

^bNumber (%) of barrier response and Grade (Gr) were shown.

^cMean ± standard deviation of barrier score was shown.

Table 4 Barriers to personal practice

Barriers	All	Physicians	Dietitians	Therapists	Nurses	Pharmacists	Others	P-value ^a
No. of evaluable responses	1227	302	218	193	236	252	26	
Screening								
When to screen for weight loss	86 (7.2) ^b	20 (6.7)	1 (0.5)	13 (7.0)	29 (12.6)	22 (9.0)	1 (4.2)	<0.0001
Rarely necessary or unaware	Gr 0	Gr 0	Gr 0	Gr 0	Gr 1	Gr 0	Gr 0	
Not done at each visit	570 (60.0)	182 (66.4)	78 (45.4)	93 (65.0)	126 (66.0)	85 (53.5)	6 (54.6)	<0.0001
	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	Gr 3	
No tracking	294 (28.9)	85 (30.6)	39 (22.0)	42 (26.8)	67 (33.7)	55 (28.7)	6 (46.2)	0.1353
	Gr 2	Gr 2	Gr 1	Gr 2	Gr 2	Gr 2	Gr 2	
Responsible person for weight screening	172 (14.9)	28 (9.6)	20 (10.0)	25 (13.8)	35 (15.7)	56 (23.9)	8 (40.0)	<0.0001
	Gr 1	Gr 0	Gr 1	Gr 1	Gr 1	Gr 1	Gr 2	
Diagnosis								
Attention to diagnosis	566 (52.0)	133 (46.8)	75 (39.5)	78 (47.9)	134 (62.9)	136 (62.4)	10 (50.0)	<0.0001
	Gr 3	Gr 2	Gr 2	Gr 2	Gr 3	Gr 3	Gr 3	
Actions for diagnosis (6 items)	164 (14.0)	21 (7.2)	30 (14.1)	34 (18.2)	31 (14.0)	41 (17.7)	7 (28.0)	<0.0001
	Gr 1	Gr 0	Gr 1	Gr 1	Gr 1	Gr 1	Gr 2	
Treatment								
Actions for treatment (7 items)	253 (23.6)	35 (12.0)	46 (24.1)	57 (36.5)	48 (23.7)	58 (27.4)	9 (45.0)	<0.0001
	Gr 1	Gr 1	Gr 1	Gr 2	Gr 1	Gr 2	Gr 2	
Challenge to recommend nutrition	553 (56.2)	145 (54.3)	65 (37.6)	87 (63.5)	108 (56.0)	139 (70.2)	9 (56.3)	<0.0001
	Gr 3	Gr 3	Gr 2	Gr 3	Gr 3	Gr 3	Gr 3	
Use of guidelines	684 (76.2)	207 (80.2)	85 (53.1)	90 (75.0)	156 (85.3)	142 (84.5)	4 (44.4)	0.0021
	Gr 4	Gr 4	Gr 3	Gr 4	Gr 4	Gr 4	Gr 2	
Specialists' availability for referral	768 (83.7)	233 (86.9)	94 (64.0)	104 (84.6)	161 (87.5)	166 (90.2)	10 (83.3)	<0.0001
	Gr 4	Gr 4	Gr 3	Gr 4	Gr 4	Gr 5	Gr 4	
Barrier score	36.5 ± 16.7 ^c	37.4 ± 15.7	26.0 ± 16.0	37.4 ± 16.6	40.7 ± 16.3	39.7 ± 15.5	42.0 ± 25.9	<0.0001

^aInterprofessional differences were tested by the χ^2 test or Wilcoxon's test.

^bNumber (%) of barrier response and Grade (Gr) were shown.

^cMean ± standard deviation of barrier score was shown.

cal exercise, (6) refer to a specialist for psychosocial support and (7) prescribe progestational agents (Table S2). Nearly a quarter (23.6%, Grade 1) of the respondents indicated that these essential treatment options were not provided or were unknown, with the highest barrier grade in rehabilitation therapists (Grade 2), showing a statistical difference by profession. More than half (56.2%, Grade 3) of the respondents found it difficult to provide nutritional advice to patients with cancer cachexia, with the highest barrier grade in pharmacists and rehabilitation therapists (Grade 3). Surprisingly, one third (Grade 2) of the dietitians found it difficult to provide nutritional recommendations. Three quarters (76.2%, Grade 4) of respondents reported rare or no use of tools and resources such as evidence-based guidelines when caring for patients with cachexia, with all professions except dietitians in Grade 4. Most respondents (83.7%, Grade 4) reported limited availability of specialist consultations, especially with pharmacists.

The mean \pm SD of barriers to personal practice on a 100-point scale was the lowest of all barrier scores (36.5 ± 16.7 ; Table 4 and Figure 2).

Barriers in team practice

Barriers to interprofessional team care

Approximately half (50.4%, Grade 3) of the respondents reported rare or no participation in the interprofessional care team for cancer cachexia, with the highest barrier grade among pharmacists and rehabilitation therapists (Grade 3). This gap was possibly influenced by the fact that physician–nurse teams were mainly responsible for whole cancer care in Japan and making referrals to other specialists individually as consultants rather than as part of a team structure. Difficulty in interprofessional collaboration was also reported by 35.4% (Grade 2), with the highest barrier grade among pharmacists (Grade 3). Clear roles and responsibilities of cachexia care team members were not or rarely seen by 54.1% (Grade 3), with the highest barrier grade among pharmacists, rehabilitation therapists and nurses (Grade 3). Most respondents (83.2%, Grade 4) agreed or strongly agreed that care by a team of multiple professionals could result in no one being responsible for overall care, with the highest barrier grade in dietitians (Grade 5) and Grade 4 in other professionals. In addition, one third (34.9%, Grade 2) reported a lack of respect for each profession among their interprofessional cachexia care teams.

Barriers in the medical environment and others

Most respondents (84.1%, Grade 4) agreed or strongly agreed that care was influenced by reimbursement availability. Regarding patient compliance, 86.0% (Grade 4) or 90.6% (Grade 5) of the respondents agreed or strongly agreed that patients' preferences or disease processes impacted success in care, respectively. The responses for these three questions were similar across professions.

The mean \pm SD of barriers to team practice scored on a 100-point scale was 55.6 ± 21.8 (Table 5 and Figure 2).

Barriers in education

The lack of education in the mandatory curriculum increased from general nutrition (45.8%, Grade 2) to nutrition in cancer (77.3%, Grade 4) to nutrition in cancer cachexia (81.9%, Grade 4). By profession, the barrier grade for nutrition education in cancer cachexia was the highest among rehabilitation therapists and pharmacists (Grade 5) and the lowest in nurses (Grade 3). Half of the respondents (49.8%, Grade 2) reported that they did not engage in continuing education or professional development in any type of postgraduate programme for nutrition, with the highest barrier grade in nurses, physicians and pharmacists (Grade 3) and lowest in dietitians (Grade 1).

The mean \pm SD of barriers in education scored on a 100-point scale was 63.7 ± 31.3 (Table 6 and Figure 2).

Comparison of barrier scores by profession

Generally, the barriers in the six domains scored on a 100-point scale were the largest in education, followed by team practice, knowledge, perception, confidence and personal practice, as shown in Figure 2. Statistically significant interprofessional differences were found for all domains, especially large disparities in the confidence and education domains. Pharmacists had the highest (confidence and team practice) or second highest (knowledge, perception, personal practice and education) barriers for all six domains among all professionals. Nurses had the highest barriers to knowledge, perception and personal practice and the second highest barrier to confidence, despite having the second lowest barrier in education. Rehabilitation therapists had the highest barrier in education and the second highest barrier in team practice, despite having the second lowest barrier in perception and personal practice. Physicians had the lowest barrier to confidence and knowledge and the second lowest barrier to personal and team practice. Dietitians had the lowest (perception, personal and team practice and education) or second lowest (confidence and knowledge) barriers for all six domains.

Discussion

We here reported the results of the Japanese subgroup analysis of a large international survey on barriers to interprofessional cancer cachexia care, jointly designed and conducted by the advisory boards in Japan, Europe and North America. First, we found significant barriers to all six domains of cancer cachexia care among Japanese HCPs, especially serious chal-

Table 5 Barriers to team practice

Barriers	All	Physicians	Dietitians	Therapists	Nurses	Pharmacists	Others	P-value ^a
No. of evaluable responses	1227	302	218	193	236	252	26	
Interprofessional care	450 (50.4) ^b	100 (39.8)	59 (37.1)	72 (58.5)	84 (48.6)	127 (72.6)	8 (66.7)	<0.0001
Participation in interprofessional cachexia care team								
Easy interprofessional collaboration	Gr 3 324 (35.4) Gr 2	Gr 2 62 (24.4) Gr 1	Gr 2 34 (20.9) Gr 1	Gr 3 59 (47.6) Gr 2	Gr 2 70 (38.9) Gr 2	Gr 3 94 (51.7) Gr 3	Gr 3 5 (38.5) Gr 2	<0.0001
Clear responsibility of cachexia care team members	486 (54.1)	122 (48.2)	48 (29.8)	82 (66.7)	109 (62.3)	117 (67.6)	8 (61.5)	<0.0001
Lack of responsibility of cachexia care team members	Gr 3 805 (83.2)	Gr 2 210 (79.6)	Gr 2 155 (92.3)	Gr 3 104 (79.4)	Gr 3 159 (82.4)	Gr 3 163 (83.2)	14 (87.5)	<0.0001
Respect to members	Gr 4 311 (34.9) Gr 2	Gr 4 68 (27.2) Gr 2	Gr 5 29 (18.1) Gr 1	Gr 4 56 (45.9) Gr 2	Gr 4 82 (47.4) Gr 2	Gr 4 71 (41.3) Gr 2	Gr 4 5 (38.5) Gr 2	0.0081
Environmental factors								
Necessity of reimbursement	791 (84.1)	216 (83.7)	144 (86.2)	103 (81.8)	151 (83.0)	164 (85.4)	13 (81.3)	0.8196
Major impact of patient preference	Gr 4 817 (86.0)	Gr 4 227 (88.0)	Gr 4 150 (89.3)	Gr 4 101 (79.5)	Gr 4 156 (83.0)	Gr 4 170 (87.6)	Gr 4 13 (86.7)	0.0714
Major impact of disease process	Gr 4 856 (90.6)	Gr 4 233 (90.3)	Gr 4 148 (88.6)	Gr 4 109 (86.5)	Gr 4 176 (93.6)	Gr 4 177 (92.7)	Gr 4 13 (86.7)	0.1802
Barrier score	Gr 5 55.6 ± 21.8 ^c	Gr 5 52.0 ± 20.5	Gr 4 46.3 ± 19.7	Gr 4 61.0 ± 23.9	Gr 5 58.0 ± 21.7	Gr 5 63.8 ± 19.7	Gr 4 59.1 ± 22.4	<0.0001

^aInterprofessional differences were tested by the χ^2 test or Wilcoxon's test.

^bNumber (%) of barrier response and Grade (Gr) were shown.

^cMean ± standard deviation of barrier score was shown.

Table 6 Barriers in education

Barriers	All	Physicians	Dietitians	Therapists	Nurses	Pharmacists	Others	P-value ^a
No. of evaluable responses	1227	302	218	193	236	252	26	
Lack of education in the mandatory curriculum	433 (45.8) ^b	133 (51.6) Gr 3	17 (10.3) Gr 1	96 (75.0) Gr 4	67 (36.2) Gr 2	112 (58.0) Gr 3	8 (50.0) Gr 3	<0.0001
Nutrition in cancer	730 (77.3)	197 (76.4) Gr 4	110 (66.7) Gr 3	118 (92.2) Gr 5	117 (63.2) Gr 3	174 (90.2) Gr 5	14 (87.5) Gr 4	<0.0001
Nutrition in cancer cachexia	774 (81.9)	211 (81.8) Gr 4	127 (77.0) Gr 4	117 (91.4) Gr 5	130 (70.3) Gr 3	176 (91.2) Gr 5	13 (81.3) Gr 4	<0.0001
No engagement in continuing education/ continuing professional development on nutrition	471 (49.8) Gr 2	154 (59.7) Gr 3	19 (11.5) Gr 1	60 (46.9) Gr 2	124 (67.0) Gr 3	104 (53.9) Gr 3	10 (62.5) Gr 3	<0.0001
Barrier score	63.7 ± 31.3 ^c	67.3 ± 31.5	41.4 ± 26.0	76.4 ± 26.3	59.2 ± 32.8	73.3 ± 25.9	70.3 ± 29.2	<0.0001

^aInterprofessional differences were tested by the χ^2 test or Wilcoxon's test.

^bNumber (%) of barrier response and Grade (Gr) were shown.

^cMean ± standard deviation of barrier score was shown.

allenges in education and team practice. Second, there were large interprofessional disparities in the four domains of confidence, knowledge, team practice and education, with particularly large barriers among pharmacists and nurses. Finally, education on cancer cachexia was rarely adopted in the mandatory educational curriculum for all professions. Opportunities for postgraduate education were also limited to all professions, except for dietitians.

The main analysis of GENESIS-CC suggested that large barriers exist among HCPs for all six domains.²⁰ Similarly, we found that Japanese HCPs had significant barriers to cancer cachexia care, scoring >35 on a 100-point scale for the domains. Large barrier scores exceeding 50 points were found in education and team practice, presumably as sources of other barriers. Some domains suggested larger barriers among the Japanese subgroup than those among the GENESIS-CC cohort. Confidence in cachexia care was lower in the Japanese subgroup (25.2%) than in the overall population (32%). By profession, a large difference in confidence was seen among dietitians (65.8% in the whole cohort vs. 27.1% in the Japanese subgroup), nurses (64.8% vs. 18.2%) and physicians (60.0% vs. 43.4%). However, these differences cannot necessarily be attributed to international differences in medical care and may be biased by the demographics of the respondents. We distributed the survey not only to HCPs specialized in cancer care but also to those in general medicine, nursing and pharmacology to capture the overall picture of the Japanese medical community. Therefore, designated cancer hospitals accounted for only approximately half of the respondents' primary practice locations. The remaining half was from a wide range of medical institutions, such as private hospitals, pharmacies, home care stations, geriatric/rehabilitation centres, multispecialty group practices and solo practices. This background may affect the international discrepancies in confidence in care because the perception of cachexia was reportedly poor in HCPs of medical facilities that do not specialize in cancer care.¹⁶

Five major surveys evaluated cancer cachexia among global HCPs (Table S3). Four surveys focused on HCPs in medical oncology or palliative/supportive care,^{9,10,18,19} while one targeted HCPs in general medicine.¹¹ In Australia and New Zealand, 36.3% of HCPs lacked confidence in managing cancer cachexia,¹⁹ which aligns with our findings. Additionally, two studies^{9,19} reported that 35–83% of HCPs misunderstood the weight loss cut-off. A US study showed that 60% of oncologists perceived cancer cachexia as unavoidable,¹⁸ which is consistent with our results on perceptions. Regarding post-screening re-evaluation rates, one study showed 75%,¹⁹ similar to the 28.9% not tracked rate observed in our study. In Spain, Australia and New Zealand, and the United States, most HCPs prescribed multimodal interventions.^{11,18,19} However, an Italian study¹⁰ revealed that 20% of HCPs did not provide nutritional therapy due to resource limitations, reflecting challenges similar to Japan's situation in nutrition specialist

availability. Moreover, two studies^{11,19} highlighted HCPs' lack of education on nutrition or cancer cachexia, mirroring the situation in Japan. These findings suggest similarities and differences between Japanese and global medical communities in addressing cancer cachexia.

Likewise, in Japan, two surveys on cancer cachexia among HCPs have been conducted (Table S4). Amano et al. investigated 1188 HCPs from 258 Japanese designated cancer hospitals, with over 90% of respondents involved in palliative care or medical oncology.¹⁷ Their findings closely align with our survey, highlighting similar issues such as a lack of care confidence, poor knowledge of weight loss cut-off, perception of unavoidability and inadequate HCP education. The presence of gaps between perception and clinical practice was also evident. Interprofessional disparities were observed in all domains, with pharmacists exhibiting notably lower confidence in care than other professions, consistent with our findings. In contrast, Nakahara et al. surveyed rehabilitation therapists and nutritionists primarily from general recovery rehabilitation wards and long-term care facilities,¹⁶ where 83% did not recognize the need for diagnosing cachexia. Our study encompassed both populations, shedding light on the common challenges faced by the overall healthcare system in Japan.

Although several international societies have developed guidelines for cancer cachexia or those at risk for cancer cachexia,^{3,22,23} there are still no Japanese guidelines for it. Consequently, cancer cachexia is rarely adopted in mandatory educational curricula or qualification examinations for Japanese HCPs. Another challenge indicated by most respondents was that the care is influenced by reimbursement availability. The only therapeutic intervention approved for treating cancer cachexia in Japan is anamorelin hydrochloride.⁴ Neither rehabilitation nor nutritional counselling can be reimbursed for cancer cachexia. Reimbursement affects human resource investment plans, and many oncology facilities employ fewer full-time rehabilitation therapists and dietitians than general hospitals do and may hesitate to invest in or install screening systems for cancer cachexia. These environmental factors may be major hurdles in building a qualified interprofessional team for cancer cachexia in Japan and other areas.

This study had the following five limitations. First, it was a subgroup analysis and did not set a predefined sample size for the interprofessional comparison of barriers. Second, the clinically significant interprofessional differences for each questionnaire item were unclear. Therefore, statistically significant differences are not necessarily clinically significant. Third, the survey was biased towards five professions (physicians, dietitians, nurses, rehabilitation therapists and pharmacists) and included a few psychotherapists and social workers. These professions should be investigated separately in the future. In addition, HCPs interested in supportive care may have primarily participated in the survey because the collaborating supportive, nutritional and exercise care societies dis-

seminated the questionnaire using their society's websites, newsletters, emails and social media. Fourth, the 100-point scale was an original approach not used in previous cancer cachexia studies, making it difficult to compare the calculated numbers with external data due to the absence of existing benchmarks. However, similar 100-point scale methods, like the European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire-C30, enable internal comparisons of different domains, facilitating issue identification and strategy development. Additionally, this method allows visualization and comparison of care barriers in HCPs and healthcare environments across different settings and professions, enabling targeted actions for addressing them. Finally, the rules of the scoring system may vary across healthcare settings. The definition of barriers in each item is influenced by the approved pharmacologic and non-pharmacologic therapies for cancer cachexia and differences in the mandatory education system. Experts in each country must modify the scoring system before applying it to their surveys.

Conclusions

There is a significant need to improve the education system and promote interprofessional practice of cancer cachexia for most Japanese HCPs, especially pharmacists and nurses. Adopting cancer cachexia into the pre-graduate and post-graduate education curricula is urgently needed. More therapeutic evidence and fewer environmental barriers, including reimbursement availability, would promote interprofessional care for cancer cachexia.

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Conflict of interest statement

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Online supplementary material

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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