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Nationwide Survey of Pharmacist Involvement in Managing Cancer Pain in Children

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Background: Cancer pain distresses pediatric patients, affects quality of life, and is a psychological burden for families. The purpose of this study was to clarify the role of pharmacists in assisting children with cancer pain and their families.

Methods: Between February and May 2024, a nationwide questionnaire survey was conducted among hospital pharmacists from the Japanese Society for Pharmaceutical Palliative Care and Sciences. The survey examined pharmacist involvement with children <15 years of age with cancer pain and their families, particularly in pain assessment, explaining analgesic use, and managing psychological, social, and spiritual pain.

Results: Of 2,720 pharmacists, 219 (8.1%) responded, 57 of whom (26.0%) had pediatric palliative care experience. Most pharmacists performed pain assessments, provided analgesic explanations (86.0%), and intervened in psychological, social, and spiritual pain (54.4%). Among those who intervened, more than 90% either communicated with patients and their families or listened to their concerns. Pharmacists with ≥5 years of experience were significantly more involved in psychological, social, and spiritual pain than were those with <5 years of experience (odds ratio, 3.46; 95% confidence interval, 1.04-11.54). However, most pharmacists reported difficulties in pain assessment and providing analgesic explanations; the main reasons were "due to patient age and comprehension" (87.0%) and "reluctance to initiate opioid analgesics by patients or their families" (68.3%), respectively.

Conclusions: Pharmacists were actively engaged in pain management for children with cancer and their families. However, most reported difficulties, particularly in pain assessment and analgesic explanations. Therefore, educational programs should be developed to facilitate effective pain management.
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Key words: pediatric, pharmacist, cancer, pain, family

Introduction

Cancer pain is a common distress symptom in children with cancer. Children experience substantial suffering from pain throughout long treatment trajectories[1–3]. Several studies have shown that 53-78% of pediatric patients with cancer experience pain[4–7]. Children also experience

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various symptoms, including anxiety, depression, fatigue, fear, irritability, and anger[8]. More frequent pain and increased pain-related worry are associated with worse physical and emotional health-related quality of life[9].

Parental involvement is essential in pain management for children. A quantitative survey revealed that 88.7% of parents used at least one pharmacological, physical, or psychological pain management strategy for their children with cancer[10]. Moreover, parents as well as children often experience psychological burdens such as anxiety, distress, and financial difficulties[11–13]. Therefore, it is important to implement a multimodal approach to pain management that combines physical, psychological, and social strategies to minimize the pain and distress of children and their families. However, pain management in pediatric patients is difficult owing to differences in children's development and comprehension, and parent perception.

The intervention of a multidisciplinary team is crucial for pain management for children with cancer. Several studies have shown that interventions by healthcare professionals can reduce pain[14–16]. Nonpharmacological interventions such as hypnosis[15] and music therapy[16] were reported to significantly reduce anxiety and pain. However, few reports have examined the role and contributions of pharmacists for pediatric patients with cancer.

By addressing the concerns of children and their families while explaining analgesic use, pharmacists play an important role in managing the pain of children with cancer. Some studies reported that pharmacist involvement in pain management significantly reduced pain in adults with cancer[17,18]. However, there is little evidence to support the effectiveness of pharmacist interventions in pain management for children with cancer. Moreover, little is known about how pharmacists interact with patients and their families when assessing pain, explaining analgesics, and managing psychological, social, and spiritual pain. Therefore, this study analyzed pharmacist involvement with pediatric cancer patients experiencing pain and their families.

Materials and Methods

Survey and Respondents

We conducted a web-based questionnaire survey using Google Forms between February 19 and May 31, 2024. Hospital pharmacists from the Japanese Society for Pharmaceutical Palliative Care and Sciences (JPPS) were recruited. We sent e-mails through the mailing list of JPPS members, and reminder e-mails were sent four times during the study period. JPPS members who agreed to complete the survey were included. No incentives were offered to the respondents.

Certification of Board-certified Pharmacist in Palliative Pharmacy

The JPPS began certifying board-certified pharmacists in palliative pharmacy (BCPPP) in 2009. Pharmacists are eligible to apply for certification if they meet the requirements, which include work experience as a pharmacist for at least 5 years, course attendance (100 credits), presentations at conferences on palliative care medicine (two presentations), experience in palliative medicine drug management and guidance (30 cases for hospital pharmacists or 15 cases for pharmacy pharmacists), and satisfactory performance on the certification examination.

Questionnaire Survey

The patients involved were children (age <15 years) with cancer pain. The questionnaire comprised 25 questions in four sections (**Supplementary Table 1**: https://doi.org/10.1272/jnms.JNMS.2025_92-406). In the first section, we collected data on the characteristics of the respondents, including years of experience as a pharmacist, sex, type of institution, pharmacy board certifications (i.e., pediatrics, oncology, and palliative care), involvement with a palliative care team, and experience in pediatric palliative care. If respondents were engaged in pediatric palliative care, they were asked questions on their involvement with the pediatric cancer patients they had encountered, including the total length of experience, age of patients, and types of pediatric cancer, which were categorized according to the International Classification of Childhood Cancer[19]. Respondents not involved in pediatric palliative care were asked to specify the reasons. In the second section, we asked respondents about assessing pain in patients with pediatric cancer. The questions covered implementation of pain assessments for pediatric patients, the pain rating scales used, priorities in performing pain assessment, difficulties encountered in conducting pain assessment, and reasons for not performing pain assessment. The third section included items on explaining analgesics (i.e., non-opioid analgesics, opioid analgesics, and adjuvant analgesics). The questions covered implementation of analgesic explanations for patients and/or their parents, recipients of the explanation by age group, tools used, difficulties encountered, barriers to intervention, and reasons for not providing explanations of analgesics. In the fourth section, we asked about pharmacist involvement in interventions for psychological, social, and spiritual pain. The survey

examined whether they had ever intervened, the specific interventions used, and reasons for not intervening.

Ethical Consideration

This study was approved by the Ethics Committees of Kyushu University Hospital and Medical Institutions (Approval No. 23331-00, February 7, 2024). All respondents provided informed consent.

Statistical Analysis

Categorical variables are expressed as frequencies and proportions. Univariate logistic regression analysis was conducted to examine associations of pharmacist involvement in psychological, social, or spiritual pain with their background characteristics. Results are expressed as odds ratios (ORs) with 95% confidence intervals (CI). A *P* value of <0.05 was considered to indicate statistical significance. All statistical analyses were performed using the JMP 17 software (SAS Institute, Cary, NC, USA).

Results

Characteristics of Respondents

Of the 2,720 hospital pharmacists, 222 responded during the study period. After excluding three who did not consent to the survey, 219 respondents were included in the analysis. The survey response rate was 8.1%. The characteristics of the respondents are shown in **Table 1**; 141 respondents (64.3%) had ≥15 years of experience as a pharmacist. Sex distribution was almost equal (49.8% male and 48.9% female). Seventy-nine (36.1%) respondents worked in designated cancer care hospitals, followed by university hospitals (28.3%) and general hospitals (26.5%). Regarding pharmacy board certifications, 118 (53.9%) respondents held BCPPP certification, and 55 (25.1%) held the JPPS certification of Board-Certified Provisional Guidance Pharmacist in Palliative Pharmacy. Thirteen respondents (5.9%) held the Japan Society of Developmental Pharmacology and Therapeutics Japan Pharmacists Education Center (JSDPT JPEC) Certified Pharmacist in Pediatric Pharmacotherapy certification. One hundred and forty-five (66.2%) respondents were involved with a palliative care team, and 57 (26.0%) had experience in pediatric palliative care. The reasons for not being involved in pediatric palliative care are shown in **Supplementary Table 2** (https://doi.org/10.1272/jnms.JNMS.2025_92-406).

Table 2 illustrates the characteristics of the respondents who were involved in pediatric palliative care (n = 57). Thirty-seven (64.9%) respondents had 15 or more years of experience as a pharmacist. Most respondents worked in university hospitals (57.9%), followed by those employed by designated cancer care hospitals (24.6%). Regarding pharmacy board certifications, 29 (50.9%) respondents held the BCPPP certification. Forty-one respondents (71.9%) were involved with a palliative care team. Regarding experience in pediatric palliative care, 36 (63.2%) had been involved for <3 years. The proportion of pharmacist involvement increased progressively with patient age, reaching 80.7% for patients aged 13-14 years. The most common childhood cancers the respondents had encountered were leukemia, myeloproliferative diseases, myelodysplastic diseases (77.2%), followed by neuroblastoma and other peripheral nervous cell tumors (61.4%), and malignant bone tumors (52.6%).

Pain Assessment

Fifty-seven respondents were involved in pediatric palliative care. The frequency of pain assessment was as follows: always (61.4%), sometimes (21.0%), rarely (8.8%), and never (8.8%). Respondents who responded "never" gave reasons such as the role of other healthcare professionals (e.g., physician or nurse) (n = 4), difficulty in pediatric pain assessment (n = 1), lack of an established relationship between with the patient or their family (n = 1), and other reasons (n = 2). If a respondent responded "always", "sometimes", or "rarely", they (n = 52) proceeded to answer the next questions (**Fig. 1**). Regarding the assessment method, the proportion of respondents who used the Numerical Rating Scale increased with patient age. The use of the Face Rating Scale peaked in the age group 4-5 years. The proportion of respondents who used the Face, Legs, Activity, Cry, Consolability scale peaked in the age group 1.5-3 years and then decreased with patient age. Factors prioritized by pharmacists when performing pain assessments are presented in **Figure 2a** (n = 52). The most common responses included information from the patient's family (73.1%), activity (71.2%), information from the patient (69.2%), and facial expression (63.5%). When asked if it was difficult to perform pain assessments in pediatric patients with cancer, most (88.5%, n = 46/52) responded "yes" and few (11.5%, n = 6/52) responded "no". **Figure 2b** shows the reasons for the difficulty in adequately assessing pain (n = 46). The most common reasons were "difficulty interpreting pain expressions due to patient age and comprehension" (87.0%), "communication difficulties due to lack of established pharmacist-patient relationship" (39.1%), "poor patient condition" (37.0%), and "discrepancy in pain assessment between pharmacist and the patient or their family" (34.8%).

Table 1 Characteristics of respondents (n = 219)

Characteristics	n (%)
Years of experience as a pharmacist	
<3 years	3 (1.4)
3–4 years	3 (1.4)
5–9 years	33 (15.1)
10–14 years	39 (17.8)
≥15 years	141 (64.3)
Sex	
Male	109 (49.8)
Female	107 (48.9)
Declined to state	3 (1.3)
Type of institution	
Designated cancer care hospital	79 (36.1)
University hospital	62 (28.3)
General hospital	58 (26.5)
Pediatric specialty hospital	4 (1.8)
Other	16 (7.3)
Involvement with a palliative care team	
Yes	145 (66.2)
No	74 (33.8)
Experience in pediatric palliative care	
Yes	57 (26.0)
No	162 (74.0)
Pharmacy board certification related to pediatrics, cancer, and palliative care (Multiple answers allowed.)	
JPPS certification of Board-Certified Pharmacist in Palliative Pharmacy	118 (53.9)
JPPS certification of Board-Certified Provisional Guidance Pharmacist in Palliative Pharmacy	55 (25.1)
JPPS certification of Board-Certified Pharmacist-Scientist in Palliative Pharmacy	2 (0.9)
JSPHCS certification of Board-Certified Oncology Pharmacist	22 (10.0)
JSPHCS certification of Board-Certified Senior Oncology Pharmacist	11 (5.0)
JSHP certification of Board-Certified Pharmacist in Oncology Pharmacy	17 (7.8)
JSHP certification of Board-Certified Oncology Pharmacy Specialist	5 (2.3)
JASPO certification of Accredited Pharmacist of Ambulatory Cancer Chemotherapy	15 (6.8)
JASPO certification of Board-certified Pharmacist of Ambulatory Cancer Chemotherapy	15 (6.8)
JSDPT JPEC Certified Pharmacist in Pediatric Pharmacotherapy	13 (5.9)
Other	8 (3.7)
No qualifications	70 (32.0)

JPPS, Japanese Society for Pharmaceutical Palliative Care and Sciences; JSPHCS, Japanese Society of Pharmaceutical Health Care and Sciences; JSHP, Japanese Society of Hospital Pharmacist; JASPO, Japanese Society of Pharmaceutical Oncology; JSDPT, Japan Society of Developmental Pharmacology and Therapeutics; JPEC, Japan Pharmacists Education Center

Explanation of Analgesics (Non-opioid, Opioid, and Adjuvant Analgesics)

The survey investigated the practice of explaining medications to patients or their families when analgesics are prescribed. Most respondents (86.0%, n = 49/57) reported providing explanations, while few (14.0%, n = 8/57) did not. The main reasons for not providing analgesic explanations were the role of other healthcare professionals (e.g., physician or nurse, n = 3), being busy with work and short on time (n = 1), and other reasons (n = 4). The proportion of analgesic explanations provided to patients and their families according to age group is shown in **Figure 3** (n = 49). The proportion of analgesic explanations given to patients increased with patient age, peaked at 81.6% for children aged 6-12 years, and decreased for children aged 13-14 years. Respondents (n = 49) used various tools to explain analgesics, including instructions created by pharmaceutical companies (59.2%), instructions created by the hospital (49.0%), oral explanation alone (42.9%), and other methods (8.2%). The frequencies of difficulty in explaining analgesic use to patients or their families were as follows: "frequently" (22.4%), "sometimes" (36.7%), "rarely" (24.5%), and "never" (16.3%). Respondents who answered "fre-

Table 2 Characteristics of respondents involved in pediatric palliative care (n = 57)

Characteristics	n (%)
Years of experience as a pharmacist	
<3 years	1 (1.8)
3–4 years	1 (1.8)
5–9 years	11 (19.3)
10–14 years	7 (12.3)
≥15 years	37 (64.9)
Sex	
Male	25 (43.9)
Female	32 (56.1)
Declined to state	0 (0)
Type of institution	
Designated cancer care hospital	14 (24.6)
University hospital	33 (57.9)
General hospital	2 (3.5)
Pediatric specialty hospital	2 (3.5)
Other	6 (10.5)
Pharmacy board certification related to pediatrics, cancer, and palliative care (multiple answers allowed)	
JPPS certification of Board-Certified Pharmacist in Palliative Pharmacy	29 (50.9)
JPPS certification of Board-Certified Provisional Guidance Pharmacist Palliative Pharmacy in Palliative Pharmacy	18 (31.6)
JPPS certification of Board-Certified Pharmacist-Scientist in Palliative Pharmacy	0 (0)
JSPHCS certification of Board-Certified Oncology Pharmacist	7 (12.3)
JSPHCS certification of Board-Certified Senior Oncology Pharmacist	4 (7.0)
JSHP certification of Board-Certified Pharmacist in Oncology Pharmacy	2 (3.5)
JSHP certification of Board-Certified Oncology Pharmacy Specialist	1 (1.8)
JASPO certification of Accredited Pharmacist of Ambulatory Cancer Chemotherapy	3 (5.3)
JASPO certification of Board-certified Pharmacist of Ambulatory Cancer Chemotherapy	1 (1.8)
JSDPT JPEC Certified Pharmacist in Pediatric Pharmacotherapy	8 (14.0)
Other	2 (3.5)
No qualifications	16 (28.1)
Involvement with a palliative care team	
Yes	41 (71.9)
No	16 (28.1)
Years of experience in pediatric palliative care	
<3 years	36 (63.2)
3–4 years	2 (3.5)
5–9 years	11 (19.3)
10–14 years	6 (10.5)
≥15 years	2 (3.5)
Age of children with cancer you have assisted (multiple answers allowed)	
<1.5 years	14 (24.6)
1.5–3 years	25 (43.9)
4–5 years	33 (57.9)
6–12 years	43 (75.4)
13–14 years	46 (80.7)
Types of pediatric cancers in which you have personal involvement (multiple answers allowed)	
Leukemia, myeloproliferative diseases and myelodysplastic diseases	44 (77.2)
Neuroblastoma and other peripheral nervous cell tumors	35 (61.4)
Malignant bone tumors (e.g., osteosarcoma, Ewing sarcoma family tumors)	30 (52.6)
Central nervous system and miscellaneous intracranial and intraspinal neoplasms	28 (49.1)
Soft tissue and other extraosseous sarcomas (e.g., rhabdomyosarcoma, fibrosarcoma)	23 (40.4)
Malignant lymphoma	21 (36.8)
Hepatic tumors (e.g., hepatoblastoma)	11 (19.3)
Germ cell tumors and trophoblastic tumors	11 (19.3)

Table 2 Characteristics of respondents involved in pediatric palliative care (n = 57) (continued)

Characteristics	n (%)
Retinoblastoma	7 (12.3)
Renal tumors (e.g., nephroblastoma)	7 (12.3)
Other and unspecified malignant neoplasms	6 (10.5)
Other malignant epithelial neoplasms and (e.g., adrenocortical carcinoma, thyroid carcinoma) malignant melanomas	5 (8.8)

JPPS, Japanese Society for Pharmaceutical Palliative Care and Sciences; JPHCS, Japanese Society of Pharmaceutical Health Care and Sciences; JSHP, Japanese Society of Hospital Pharmacist; JASPO, Japanese Society of Pharmaceutical Oncology; JSDPT, Japan Society of Developmental Pharmacology and Therapeutics; JPEC, Japan Pharmacists Education Center

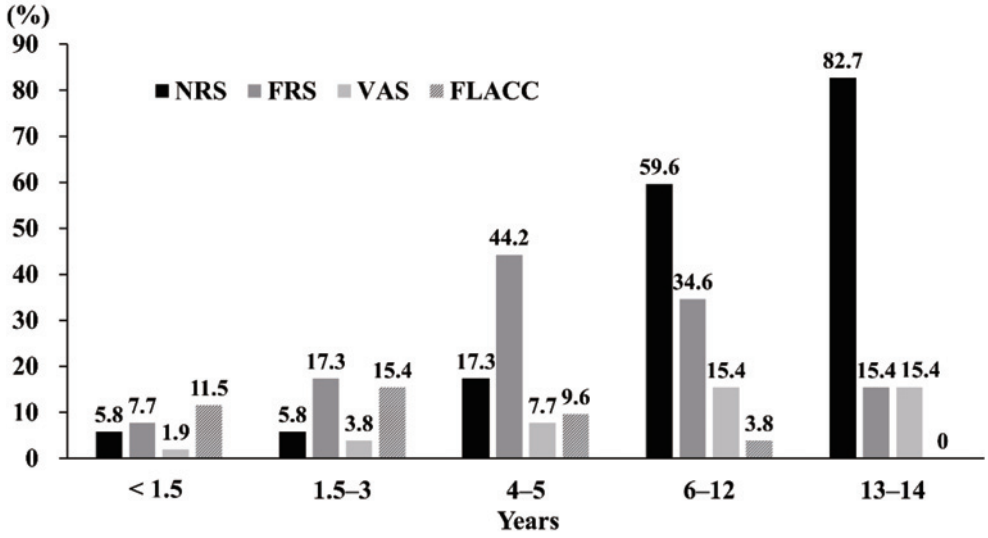

Fig. 1 Responses to pain scales, by patient age (n = 52). The x-axis indicates patient age in five categories. The y-axis indicates the proportion of pain scale use by pharmacists in relation to patient age.
VAS, Visual Analogue Scale; NRS, Numerical Rating Scale; FRS, Face Rating Scale; FLACC, Face, Legs, Activity, Cry, Consolability.

quently", "sometimes", or "rarely" were asked the next questions. **Figure 4** depicts situations in which pharmacists found intervention difficult (n = 41). The most frequently reported answers were "patient or family reluctance to initiate opioid analgesics" (68.3%), "poor understanding of the patient or family" (53.7%), and "poor understanding of the patient due to their medical condition" (26.8%).

Pharmacist Involvement in Psychological, Social, and Spiritual Pain

Regarding the question about intervention in the patients' psychological, social, or spiritual pain, of the initial 57 respondents with experience in pediatric palliative care, 31 (54.4%) answered "yes", while 26 (45.6%) answered "no". Pharmacist interventions for psychological, social, or spiritual pain are shown in **Figure 5** (n = 31). The top three intervention details were "communicate with the patient" (93.5%), "listen to the patient and their family" (90.3%), and "communicate with the patient's family" (90.3%). The relationship between pharmacist involvement and their background is shown in **Table 3**. In the univariate logistic regression analysis, pharmacists with ≥5 years of experience in pediatric palliative care were significantly more involved in psychological, social, and spiritual pain than were those with <5 years of experience (OR: 3.46, 95% CI: 1.04-11.54). The main reasons why respondents did not intervene were the role of other healthcare professionals (e.g., physician or nurse) (n = 14), lack of an established relationship between the patient or their family (n = 11), being busy with work and short on time (n = 6), lack of clarity about intervention methods (n = 5), and other reasons (n = 3). Ten respondents each who responded "the role of other healthcare professionals" (n = 14) or "lack of established rela-

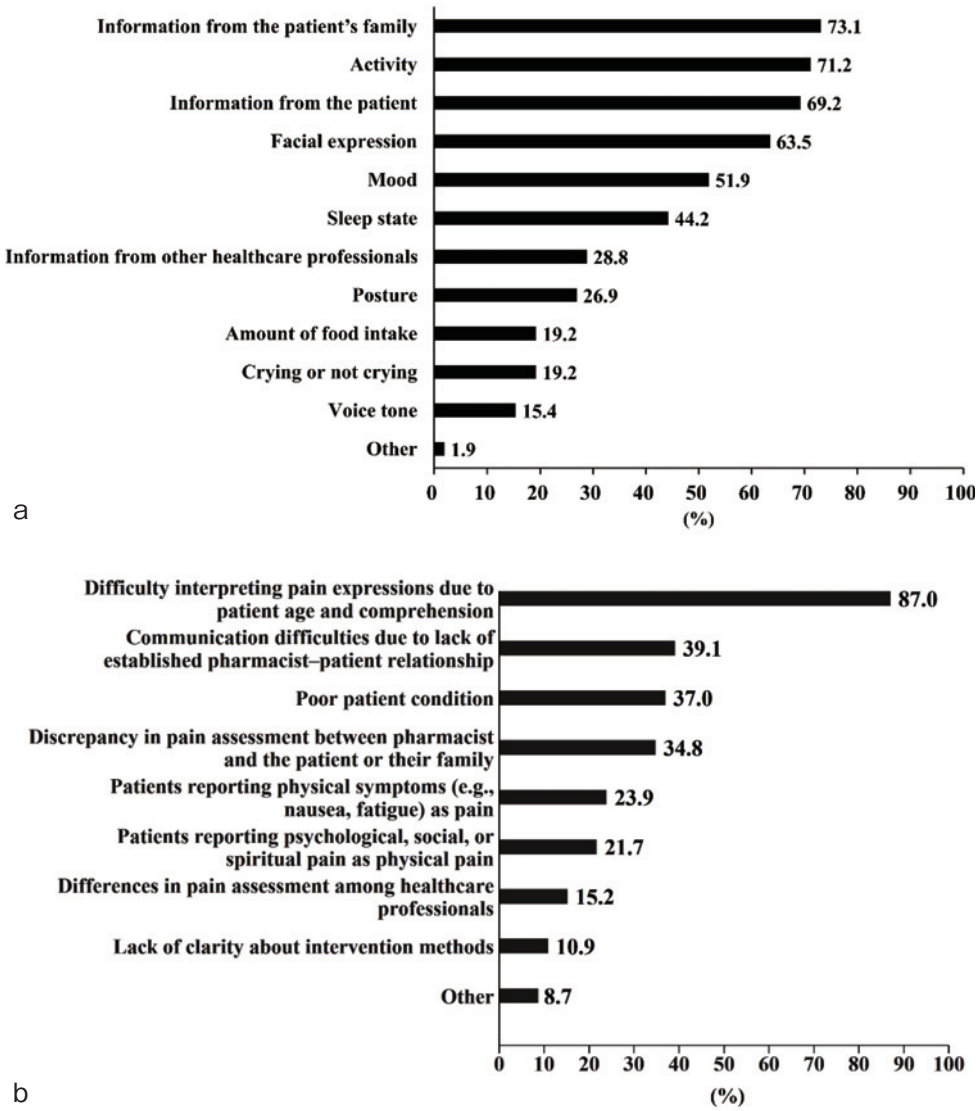

Fig. 2 Results of pharmacist assessments of pain in children with cancer.
a. Factors prioritized by pharmacists when conducting pain assessments (n = 52).
b. Reasons for difficulty in pain assessment (n = 46).
The bars represent the percentage of respondents who selected each answer.

tionship" (n = 11) had <3 years of experience in pediatric palliative care.

Discussion

This nationwide survey investigated pharmacist involvement in pain assessment, analgesic explanations, and psychological, social, and spiritual pain in pediatric patients with cancer and their families. Among the 57 respondents involved in pediatric palliative care, most (63.2%) had <3 years of experience in pediatric palliative care. Despite this limited experience, most pharmacists performed pain assessments, explained analgesics to patients and their families, and adapted their approaches to the patient's age and developmental stage. Moreover, approximately half of the pharmacists engaged in interventions for psychological, social, and spiritual pain. Pharmacists with ≥5 years of experience were significantly more involved in pain management than were those with <5 years of experience. However, pharmacists had difficulty assessing pain and explaining analgesics. These findings have clinically meaningful implications for pharmacists involved in pain management for children with cancer.

Most pharmacists used age-appropriate pain assessment scales to evaluate pain in children with cancer. This finding was consistent with recommendations for self-reported measures of chronic pain based on child age, as detailed in a previous systematic review[20]. However, most pharmacists found it difficult to assess pain in pediatric patients with cancer, primarily due to the patients' age

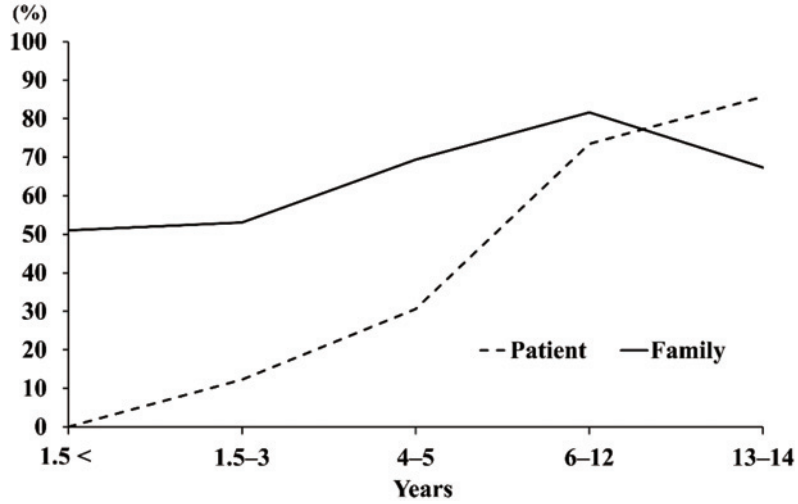

Fig. 3 Proportions of patients and their families receiving explanations of analgesic use, by patient age group (n = 49). The x-axis indicates patient age in five categories. The y-axis indicates the rate of analgesic explanations provided to patients and their families.

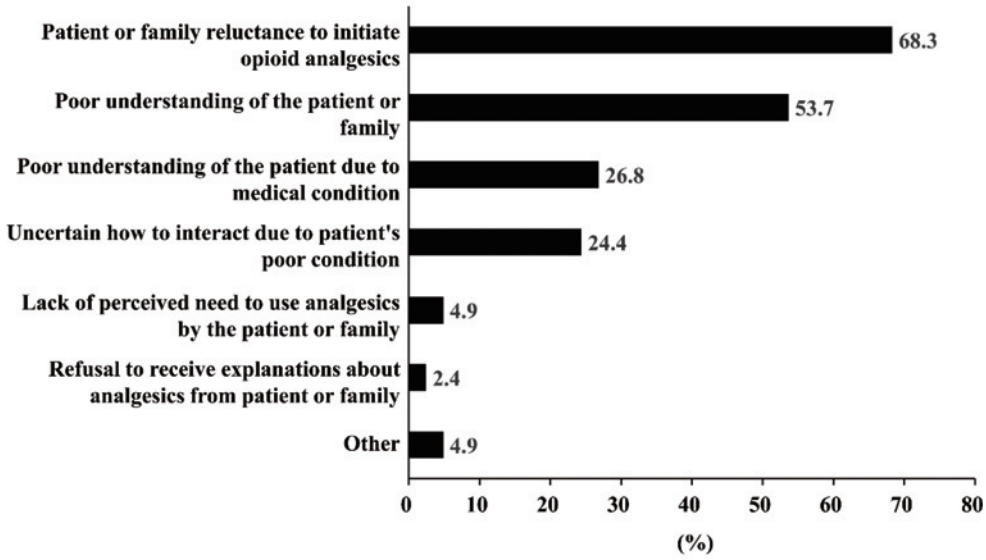

Fig. 4 Situations in which pharmacists found intervention difficult (n = 41). The x-axis indicates the proportion of pharmacists. The y-axis shows situations in which pharmacists found intervention difficult.

and comprehension issues. Children experience numerous and complicated symptoms, reflecting the depth and variety of symptom expression[21]. A longitudinal qualitative study indicated that children experienced cancer-related symptoms as overall feeling states[22]. When healthcare professionals inquired about symptoms such as physical and psychological states, children provided a minimal description of their experiences. Consequently, children's underreporting or misunderstanding of symptoms, which varies with cognitive development and comprehension, can be a major barrier for healthcare professionals. To address these issues, patient-reported outcomes (PROs) have been used, allowing children with advanced cancer to self-report their symptoms, including pain, fatigue, and other distressing symptoms[23,24]. However, these studies relied on parents to report PROs for children aged 2-6 years, suggesting that younger children may struggle to report symptoms independently. In light of these difficulties, pain-monitoring software applications that provide educational information to families have recently been developed[25,26]. Patients using these applications reported significantly less pain than nonusers.

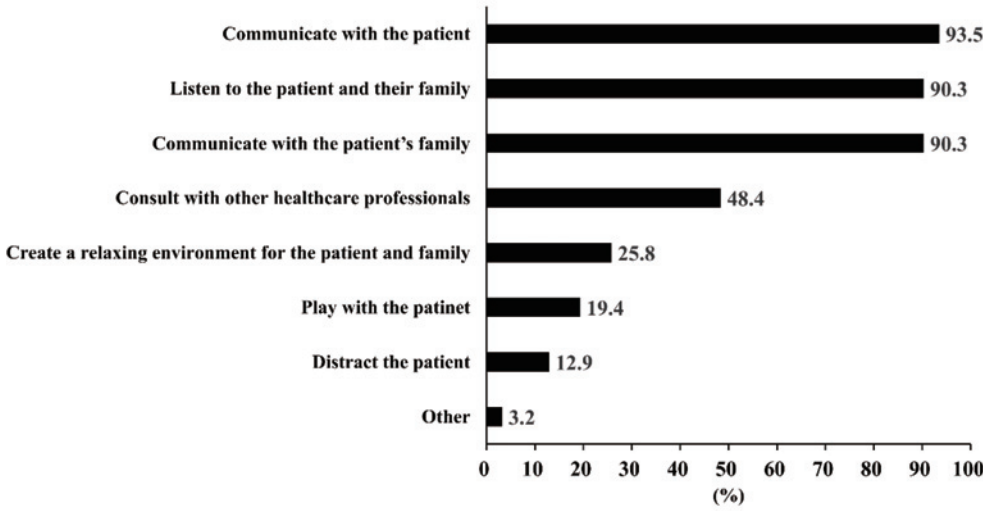

Fig. 5 Pharmacist interventions for psychological, social, or spiritual pain (n = 31). The x-axis indicates the proportion of pharmacists. The y-axis shows the context of pharmacist intervention for psychological, social, or spiritual pain.

Table 3 Relationship between pharmacist involvement in psychological, social, or spiritual pain and their background

	Univariate analysis	
	OR (95% CI)	*p* value
Years of experience as a pharmacist (≥10 years/<10 years)	1.54 (0.44-5.32)	0.50
Pharmacy board certification related to pediatrics, cancer, and palliative care (yes/no)	1.07 (0.38-3.05)	0.90
Involvement with a palliative care team (yes/no)	0.90 (0.28-2.88)	0.86
Duration of involvement in pediatric palliative care (≥5 years/<5 years)	3.46 (1.04-11.54)	0.044
Type of working facility (university hospital/other)	1.02 (0.35-2.93)	0.98
Sex (male/female)	0.84 (0.29-2.42)	0.84

OR, odds ratio; CI, confidence interval

However, PROs and pain-monitoring applications are not widely used in pediatric cancer care settings in Japan. Therefore, it is essential that pharmacists introduce these assessment tools for different age groups, provide training to patients and families, and interpret the collected data to optimize pain management.

Most pharmacists provided age-appropriate explanations of analgesics to children and their families. The proportion of those providing analgesic explanations increased with patient age, whereas the proportion of those providing such explanations to families peaked in the 6-12 years age group and subsequently declined in the 13-14 years age group, revealing an age-related pattern in the proportion of analgesic explanations. These findings reflect development in patient cognitive abilities and a gradual shift in communication focus from family to patient as children mature. Notably, most pharmacists reported difficulties with providing analgesic explanations, mainly because patients or their families were reluctant to use opioid analgesics or failed to understand the explanation provided. Reluctance to use opioids owing to concerns about addiction is a barrier to optimal cancer pain management[27]. However, it is not unique to pediatric patients. A quantitative survey showed that concerns about opioid addiction were associated with nonadherence in adults with cancer[28]. Other factors influencing nonadherence to strong opioids include fear of the side effects of long-term opioid use, the undesirable side effects of opioid use, ineffective pain control, poor understanding, and nonacceptance of the disease[5,28]. Reluctance to use opioids among children can be influenced by family decision-making, as families may have concerns about the side effects of long-term opioid use[29]. Therefore, pharmacists need to elicit specific reasons for resistance from patients and their families, as various factors contribute to opioid analgesic reluctance. Moreover, it is important to emphasize the benefits of opioid analgesics while also explaining the side effects.

Approximately half of the pharmacists reported involvement in addressing psychological, social, or spiri-

tual pain. Univariate analysis showed that pharmacists with ≥5 years of experience in pediatric palliative care were more involved in interventions for psychological, social, and spiritual pain than were those with <5 years of experience. This suggests that having more experience in pediatric palliative care enhances the pharmacist skills required to manage cancer pain involving complicated factors. In addition, most (>90%) of the pharmacists intervened by communicating with patients and families or listening to their concerns. The importance of communication with patients and families has been reported in several studies[30,31]. Interviews with healthcare professionals have highlighted the importance of patiently repeating information, thereby empowering families to ask questions and ensuring their understanding[31]. Furthermore, enhanced physician-patient communication has been shown to improve patient quality of life[32]. Several reviews indicated that psychological interventions by healthcare professionals improved symptom burden and pain control[33–35]. Therefore, pharmacists should actively engage in communication with children with cancer and their families as integral members of multidisciplinary teams. Among the 45.6% of the present pharmacists who could not intervene in the psychological, social, or spiritual pain of pediatric patients with cancer, the primary reasons were that they believed that such intervention was the responsibility of other healthcare professionals or that they lacked an established relationship with the patients or their families. Moreover, most pharmacists who provided these responses had <3 years of experience in pediatric palliative care. These findings suggest that pharmacists may encounter barriers to providing interventions for psychological, social, and spiritual pain. Thus, it will be necessary for pharmacists to develop educational programs on age-appropriate communication methods for children, methods to appropriately conduct pain assessments, and techniques for addressing pain-related concerns. Comprehensive training would help mitigate barriers to pain management for children with cancer.

We acknowledge several limitations of our study. First, our study had a low response rate: only 219 JPPS members (8.1%) participated despite multiple e-mail reminders. This limited sample size may have introduced bias into our results, potentially affecting our overall findings. Additionally, it is important to consider whether our target population was appropriate for evaluating pharmacist involvement in pediatric cancer pain management. Our respondents were members of the JPPS, which consists of pharmacists with an interest in palliative care. However, not all members have direct experience in managing pediatric cancer pain. As indicated in **Supplementary Table 2**, the primary reasons for non-involvement included a lack of pediatric patients in their practice setting and limited opportunities to participate in pediatric palliative care. These factors suggest that our sample may not fully represent pharmacists who are actively engaged in pediatric cancer pain management. Future studies should consider expanding the survey to include pharmacists from broader professional organizations, such as those specializing in pediatric pharmacy or oncology, to obtain a more representative sample and better understand pharmacists' roles in managing pediatric cancer pain. Second, we did not investigate the impact of pharmacists' pain management interventions on patients and their families. Therefore, future research on patients and their families should attempt to identify the most effective interventions in pain management.

In conclusion, pharmacists were actively engaged in age-appropriate pain assessment, explanations of analgesic use, and interventions for psychological, social, and spiritual pain for children with cancer pain. However, many pharmacists reported difficulties assessing pain and explaining analgesics when caring for children. Therefore, we should develop comprehensive educational programs that enable pharmacists to effectively manage pain in children with cancer. Future studies should evaluate the impact of pharmacist involvement in pain management for children with cancer and their families' satisfaction with care.

Conflict of Interest: The authors declare no conflicts of interest.

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