



## Original Article

# Knowledge levels of oncology nurses regarding evidence-based practices in the assessment and management of chemotherapy-induced peripheral neuropathy

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## ABSTRACT

**Objective:** The study aimed to determine the level of oncology nurses' knowledge of evidence-based practice for assessing and managing chemotherapy-induced peripheral neuropathy (CIPN).

**Methods:** This study employed a descriptive and cross-sectional research design. It was carried out with oncology nurses who were working at a university hospital in the Western Region of Turkey and who were members of the Oncology Nursing Association. The sample of the study consisted of 96 nurses who met the inclusion criteria.

**Results:** The study sample comprised 94.8% female oncology nurses, 57.3% of whom held an undergraduate degree, and over half (58.5%) of whom were employed as clinical nurses. A majority of nurses (76.0%) indicated that they had not received any training in peripheral neuropathy. 35.4% of the nurses assessed patients receiving neurotoxic chemotherapy for peripheral neuropathy at each visit/each chemotherapy cycle. A total of 43.8% of nurses indicated that they frequently assessed patients for peripheral neuropathy at the conclusion of the treatment protocol. The oncology nurses assessed the patient-reported symptoms of motor neuropathy (58.3%), sensory neuropathy (56.3%), autonomic neuropathy (51.0%), neuropathic pain (55.2%), and co-occurring symptoms (52.1%) on a frequent basis. The nurses reported that they assessed muscle strength (56.3%), gait and balance (58.3%), and quality of life (52.1%) "frequently". In contrast, they assessed deep tendon reflex (41.7%), neurological tests (36.5%), and social activities (46.8%) "rarely".

**Conclusions:** The study findings indicated that oncology nurses require further education and training in evidence-based practices for the assessment and management of CIPN.

## Introduction

Peripheral neuropathies are frequently developed in cancer patients due to the administration of neurotoxic chemotherapy agents during the treatment process. This condition is referred to as chemotherapy-induced peripheral neuropathy (CIPN). CIPN is a painful and dose-limiting side effect that significantly increases the cost of health care services. It has been reported that peripheral neuropathy develops in 30%–40% of patients receiving chemotherapy, especially chemotherapy with neurotoxic effects, and in some cases in all (100%) patients.<sup>1,2</sup>

In CIPN, neurotoxic chemotherapy agents rapidly cross the blood-nerve barrier and affect the posterior root ganglia and peripheral axons, leading to degeneration in sensory fibers and loss of small nerve fibers in the epidermal layer, causing sensory, motor, and autonomic

nerve injuries.<sup>3,4</sup> Platinum compounds, vinca alkaloids, taxanes, proteasome inhibitors, and antiangiogenic/immunomodulators are among the most commonly implicated drugs in developing peripheral neuropathy due to their neurotoxic effects.<sup>5,6</sup>

CIPN may cause several symptoms that have a negative impact on the psychological status, sleep comfort, and quality of life of patients.<sup>5</sup> The onset of symptoms varies depending on the chemotherapy agent used in treatment, with some patients experiencing symptoms immediately after the first treatment.<sup>7,8</sup> However, symptoms developing due to CIPN may occur even months after the end of treatment.<sup>9,10</sup> In CIPN, sensory symptoms, including decreased proprioception, numbness, tingling, pinprick sensation, burning, and neuropathic pain, as well as symptoms related to motor neuron damage, including muscle atrophy and weakness, are observed. Additionally, symptoms related to autonomic nerve

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injuries, such as urinary retention, constipation, blood pressure changes, and sexual dysfunction, may occur.<sup>11</sup>

It has been reported that the incidence of CIPN is affected by many factors, including age, type, dose, intensity of the chemotherapy agent, cumulative dose, duration of treatment, and pre-existing diseases.<sup>12</sup> It has been documented that patients may experience long-term complications associated with CIPN, contingent on the specific treatment regimen. CIPN related symptoms, including chronic paresthesia, numbness, sensory ataxia, functional deficits, and pain, have been observed in 30%–50% of cancer patients undergoing platinum-based anticancer regimens (oxaliplatin, cisplatin). Similarly, after taxane therapy (paclitaxel, docetaxel), acute and chronic sensory neuropathy symptoms, including paresthesia, numbness, tingling, and burning, have been observed in 80%–97% of patients.<sup>13</sup> The results of a recent study indicated that 30% of patients who received taxane treatment developed symptoms related to CIPN several years after the end of treatment.<sup>14</sup> In a further study conducted with ovarian cancer patients undergoing platinum compounds and taxane treatment, it was reported that over half of the patients exhibited neuropathy symptoms 12 years after the conclusion of their treatment. This condition was found to have a significantly detrimental impact on their quality of life.<sup>15</sup>

The early detection of CIPN is crucial for the prompt management of symptoms. Given that CIPN can manifest throughout the course of treatment and beyond, it is essential to conduct regular assessments. Oncology nurses, who are the primary health care providers for patients undergoing chemotherapy, play a pivotal role in the assessment and management of CIPN. However, it has been demonstrated in the literature that evidence-based measurement tools for evaluating the knowledge status of oncology nurses are insufficient.<sup>11,16</sup> A study was conducted with nurses working in an outpatient chemotherapy unit. The study evaluated the assessment practices of nurses regarding CIPN and their general knowledge on this subject. The results indicated that nurses were aware of the importance of this subject, yet they demonstrated inadequate assessment of CIPN and low self-confidence in neurological examination.<sup>17</sup> It was thought that determining the knowledge levels of oncology nurses regarding the assessment and management of CIPN is important in terms of determining the areas in which nurses need training and planning the necessary training activities in this regard. Furthermore, it is anticipated that the early detection of CIPN in the cancer care process, as facilitated by oncology nurses, will reduce the severity of symptoms experienced by cancer patients related to neuropathy, thereby enhancing the quality of health care services provided to patients. This study aimed to determine the level of knowledge held by oncology nurses regarding evidence-based practices for the assessment and management of CIPN.

## Methods

### Study design

This study was descriptive and cross-sectional. The study population included 652 nurses who worked in a University Medical Hospital Faculty Medical Oncology Department and were registered in the Oncology Nurses Association in the Western Region, in Turkey. Within the scope of the research, power analysis was performed to determine the sample size. For the power analysis, the effect level was 0.50 and the  $\alpha$  value was 0.05, the power value ( $1 - \beta$ ) was calculated as 0.90, and the number of samples was determined as 96. Accordingly, the study was conducted with 96 oncology nurses who completed the questionnaire in its entirety and provided feedback. The study data included the following inclusion criteria: (i) being 18 years of age or older (ii) participating in the study voluntarily (iii) having at least six months of experience in the field of oncology nursing (iv) administering chemotherapy agents. The exclusion criterion was as follows: refusal to participate in the study.

### Data collecting

The data was collected utilizing the following instruments: the Oncology Nurse Introductory Information Form, the Chemotherapy-Induced Peripheral Neuropathy (CIPN) Assessment Practices Form, the Nurse-Reported Chemotherapy-Induced Peripheral Neuropathy (CIPN) Management Practices Form, and the Barriers to Chemotherapy-Induced Peripheral Neuropathy Assessment Form. These instruments were completed between September 2019 and March 2020. The forms used in the research were prepared by the researchers in accordance with the literature.<sup>6,10–17</sup> The questionnaire was evaluated by two academicians and three oncology nurses in the faculty, with certain items being adjusted based on their comments and suggestions. All expert opinions were taken into account to evaluate the comprehensibility of the forms. The data for the research was collected by the researchers using the face-to-face interview method.

### Oncology nurse introductory information form

The form comprised seven questions developed by the researchers as a result of the literature review. These were designed to elicit information on the introductory characteristics of oncology nurses, including age, gender, education, and professional year.<sup>10–17</sup>

### Chemotherapy-induced peripheral neuropathy assessment practices form

The researchers prepared the form describing the practices of oncology nurses in the assessment of CIPN as a result of a literature review. The form consisted of 24 items in a 4-point Likert type (“never”, “rarely”, “often” and “always”). Response options were rated from 0 (never) to 3 (always).<sup>6,10–17</sup>

### Nurse-reported chemotherapy-induced peripheral neuropathy management practices form

The form reporting the oncology nurses' reports on the management of CIPN was prepared by the researchers as a result of the literature review. The form consisted of three items and seventeen sub-items. Participants used a dichotomous response format, with the options “yes” and “no,” to answer the questions.<sup>6,10–17</sup>

### Barriers to chemotherapy-induced peripheral neuropathy assessment form

The form reporting the circumstances that impede oncology nurses from assessing CIPN was developed by the researchers as a consequence of their literature review. The form comprised a single item and 14 sub-items. The participants were required to indicate their responses using the options “yes” and “no.”<sup>6,10–17</sup>

### Data analysis

The SPSS 25.0 software (IBM Corp., Armonk, New York, USA) was employed to analyze the data obtained from the study. Descriptive tests (percentage, arithmetic mean, standard deviation, and minimum–maximum) were utilized for the analysis. The frequencies of nurses with different educational qualifications (bachelor's degree versus master's degree or higher) were compared using chi-square tests. In instances where the sample size in a cell was less than five, the data was subjected to a Fisher's exact test.

### Ethical considerations

The study was approved by the Ethics Committee in Turkey and was conducted following the Declaration of Helsinki. Furthermore, permission was obtained from the Oncology Nursing Association and the institution where the research was conducted. Before completing the questionnaires, participants were required to read the informed consent text and provide their signed consent. The informed consent text detailed

the purpose and rationale of the study, information about the data collection forms, the data collection period, and the contact information of the researchers. Participants were informed that their information would be kept confidential and that they could withdraw from the study at any stage.

**Results**

Table 1 presents a summary of the socio-demographic characteristics of the oncology nurses who participated in the study. The mean age of the participants was (33.4 ± 8.4) years, the mean years of occupation was (5.3 ± 5.3) years, and the mean years of experience as an oncology nurse was (11.8 ± 9.2) years. The majority of the participants were female (94.8%), with more than half of them holding undergraduate degrees (57.3%). The majority of the participants were

**Table 1**  
Socio-demographic characteristics of oncology nurses (N = 96).

Variables	Mean ± SD	Min.-Maks.
Age (years)	33.4 ± 8.4	21.0–58.0
Oncology nursing experience (years)	5.3 ± 5.3	1.0–24.0
Year of profession (years)	11.8 ± 9.2	1.0–36.0
<b>Sex</b>		
Female	91	94.8%
Male	5	5.2%
<b>Education level</b>		
Bachelor's degree	55	57.3%
Master's degree	36	37.5%
PhD	5	5.2%
<b>Working position as an oncology nurse</b>		
Inpatient service	56	58.3%
Outpatient chemotherapy unit	14	14.6%
Education department	10	10.4%
Executive nurse	11	11.5%
Other	5	5.2%
<b>Receiving training on the management of peripheral neuropathy</b>		
Yes	23	24.0%
No	73	76.0%

**Table 2**  
CIPN assessment practices of oncology nurses (N = 96).

CIPN Assessment Practices	CIPN assessment practices of oncology nurses									
	Never, n (%)		Rarely, n (%)		Frequently, n (%)		Always, n (%)		Mean	SD
<b>Time for CIPN assessment</b>										
In every encounter with the patient	10	10.4	34	35.4	34	35.4	18	18.8	1.6	0.9
In the event of a patient reporting symptoms such as pain or numbness	5	5.2	9	9.4	47	49.0	35	36.5	2.1	0.8
At the end of treatment	10	10.4	24	25.0	42	43.8	20	20.8	1.7	0.9
<b>Assessment of patient-reported symptoms</b>										
Symptoms of motor neuropathy	3	3.1	20	20.8	56	58.3	17	17.7	1.9	0.7
Symptoms of sensory neuropathy	3	3.1	20	20.8	54	56.3	19	19.8	1.9	0.7
Symptoms of autonomic neuropathy	2	2.1	27	28.1	49	51.0	18	18.8	1.8	0.7
Co-occurring symptoms	4	4.2	26	27.1	50	52.1	16	16.7	1.8	0.7
Neuropathic pain	2	2.1	21	21.9	53	55.2	20	20.8	1.9	0.7
<b>Factors assessed in cases of CIPN development</b>										
Sensory changes	8	8.3	32	33.3	44	45.8	12	12.5	1.6	0.8
Vibration sensation	8	8.3	34	35.4	43	44.8	11	11.5	1.5	0.8
Feeling of warmth	9	9.4	25	26.0	47	49.0	15	15.6	1.7	0.8
Deep tendon reflex	22	22.9	40	41.7	27	28.1	7	7.3	1.1	0.8
Muscle strength	5	5.2	23	24.0	54	56.3	14	14.6	1.8	0.7
Gait or balance	5	5.2	15	15.6	56	58.3	20	20.8	1.9	0.7
Toxicity	27	28.1	30	31.3	29	30.2	10	10.4	1.2	0.9
Pain	4	4.2	13	13.5	49	51.0	30	31.3	2.0	0.7
Neurological tests	32	33.3	35	36.5	20	20.8	9	9.4	1.0	0.9
Social events	24	25.0	44	46.8	19	19.8	9	9.4	1.1	0.9
Sexual function	45	46.9	37	38.5	12	12.5	2	2.1	0.6	0.7
Daily life/work life	11	11.5	29	30.2	40	41.7	16	16.7	1.6	0.8
Quality of life	7	7.3	19	19.8	50	52.1	20	20.8	1.8	0.8
Security situation at home	8	8.3	16	16.7	50	52.1	22	22.9	1.8	0.8
Fine motor skills	8	8.3	22	22.9	41	42.7	25	26.0	1.8	0.9
Functional muscle strength	5	5.2	21	21.9	43	44.8	27	28.1	1.9	0.8

\*χ<sup>2</sup> test. CIPN, chemotherapy-induced peripheral neuropathy.

employed as inpatient service nurses (58.3%). It was determined that 76% of the participants had not received training on the management of CIPN.

Table 2 presents the findings of a survey of oncology nurses regarding the assessment of CIPN. The study revealed that 35.4% of oncology nurses assessed patients undergoing neurotoxic chemotherapy for peripheral neuropathy at each visit/each chemotherapy cycle. Additionally, 49.0% of nurses assessed for peripheral neuropathy when patients reported symptoms such as numbness, tingling, and pain. Finally, 43.8% of nurses assessed for peripheral neuropathy when the treatment protocol was terminated (Table 2).

The study revealed that over half of the nurses frequently assessed motor symptoms (e.g., weakness, lack of coordination, falls) (58.3%), sensory symptoms (e.g., numbness, tingling, burning) (56.3%), and autonomic symptoms (e.g., blood pressure changes, dizziness, constipation, bladder problems) (51.0%) when the status of CIPN symptoms reported by cancer patients was examined. A total of 52.1% of participants indicated that they had assessed co-occurring symptoms, including anxiety, sleep disturbances, fatigue, and cognitive changes. Additionally, 55.2% of participants reported having assessed neuropathic pain (Table 2).

In the study, pain (31.3%), functional muscle strength (28.1%) and fine motor skills (26.0%) were determined as the first three factors when the factors assessed by nurses in case of CIPN development in cancer patients were examined. Social activities (46.8%), deep tendon reflex (41.7%) and sexual functions (38.5%) were the least assessed characteristics of the patients (Table 2).

In addition, the study also found that nurses with postgraduate education differed in their assessment practices of CIPN according to their educational status. Nurses with postgraduate education level demonstrated higher assessment rates at each encounter with the patient receiving chemotherapy (P = 0.01). Furthermore, it was found that nurses with a postgraduate education level conducted a greater number of assessments of the patients' daily lives and work lives, as well as their safety status at home. These assessments were statistically significant at P = 0.05 and P = 0.02, respectively. The evaluation of the CIPN

assessment practices of nurses according to their working positions revealed that the observed differences between the groups were not statistically significant ( $P > 0.05$ ).

Table 3 presents the findings of a survey of oncology nurses regarding the practices involved in the management of CIPN. The results indicate that approximately half of the nurses defined calcium and magnesium infusions (50.0%) and almost half of the nurses defined gabapentin as an effective treatment for the prevention of CIPN. The most frequently recommended treatments for pain management of CIPN were gabapentin (46.9%), opioids (40.6%), and nonsteroidal anti-inflammatory drugs (42.7%). Furthermore, more than half of the nurses reported physical therapy (62.5%) as the recommended non-pharmacological intervention in the management of CIPN.

Table 4 shows the conditions that prevent oncology nurses from assessing CIPN. The nurses reported that insufficient knowledge (59.4%) and insufficient time (61.5%) were the most common obstacles to the assessment of CIPN. This situation was similar according to educational status.

### Discussion

CIPN is one of the dose-limiting side effects of cancer treatment and its early detection and treatment is of great importance in terms of the quality of life of cancer patients. It has been reported that there is an increase in the prevalence of CIPN and the burden associated with its late effects with the increase in survival rates parallel to the developments in cancer treatment.<sup>1</sup> Although oncology nurses play a significant role in the assessment and management of CIPN, there is a paucity of evidence to suggest that they possess the requisite competence in this area.<sup>17-19</sup> In order for nurses to be able to perform effective interventions in the management of CIPN, it is imperative that they adhere to the most recent information, evidence-based approaches, and the results of these approaches.<sup>20</sup>

CIPN has a significant impact on the activities of daily living and quality of life of cancer patients. Therefore, regular assessment with valid and reliable assessment tools is of great importance for the management of CIPN. The most recommended assessment tool in clinical research and

**Table 3**  
Oncology nurses' reports on the management of CIPN (N = 96).

Oncology Nurses' Reports on the Management of CIPN	All Nurses (n = 96)		Undergraduate (n = 55)		Postgraduate (n = 41)	
	n	%	n	%	n	%
<b>Effective treatments recommended for the prevention of CIPN</b>						
Calcium and magnesium infusions	48	50.0	29	52.7	19	46.3
Vitamin E	23	24.0	12	21.8	11	26.8
Gabapentin	45	46.9	22	40.0	23	56.1
Amitriptyline	14	14.6	9	16.4	5	12.2
Glutamine	20	20.8	13	23.6	7	17.1
Alternative treatments	25	26.0	15	27.3	10	24.4
<b>Pharmacological methods recommended for the treatment of pain in CIPN</b>						
Amitriptyline	14	14.6	6	10.9	8	19.5
Duloxetine	15	15.6	8	14.5	7	17.1
Gabapentin	45	46.9	18	32.7	27	65.9
Opioids	39	40.6	18	32.7	21	51.2
Nonsteroidal anti-inflammatory drugs	41	42.7	20	36.4	21	51.2
Capsaicin	7	7.3	7	12.7	7	17.1
Alternative treatments	32	33.3	22	40.0	10	24.4
<b>Non-pharmacological methods recommended for the management in CIPN</b>						
Acupuncture	15	15.6	9	16.4	6	14.6
Massage	29	30.2	17	30.9	12	29.3
Transcutaneous electrical nerve stimulation	35	36.5	17	30.9	18	43.9
Physiotherapy	60	62.5	37	67.3	23	56.1

CIPN, chemotherapy-induced peripheral neuropathy.

**Table 4**  
Barriers to oncology nurses' assessment of CIPN (N = 96).

Reports of Oncology Nurses	All nurses (n = 96)				Undergraduate (n = 55)				Postgraduate (n = 41)			
	Yes		No		Yes		No		Yes		No	
	n	%	n	%	n	%	n	%	n	%	n	%
There are no obstacles to my assessment	43	44.8	53	55.2	22	40.0	33	60.0	21	51.2	20	48.8
I do not have access to assessment tools for my assessment	48	50.0	48	50.0	29	52.7	26	47.3	19	46.3	22	53.7
I do not know the neuropathy-orientated physical examination method that will enable me to assess	40	41.7	56	58.3	19	34.5	36	65.5	21	51.2	20	48.8
I don't know how to make an assessment	28	29.2	68	70.8	17	30.9	38	69.1	11	26.8	30	73.2
I can make the assessment, but I am not qualified to do so	57	59.4	39	40.6	32	58.2	23	41.8	25	61.0	16	39.0
I don't have enough time	59	61.5	37	38.5	35	63.6	20	36.4	24	58.5	17	41.5
I don't know how to interpret the evaluation result	40	41.7	56	58.3	26	47.3	29	52.7	14	34.1	27	65.9
My assessment result does not make any difference to patient outcomes	12	12.5	84	87.5	6	10.9	49	89.1	6	14.6	35	85.4
My colleagues do not support this issue	31	32.3	65	67.7	15	27.3	40	72.7	16	39.0	25	61.0
This is not a priority	13	13.5	83	86.5	6	10.9	49	89.1	7	17.1	34	82.9
I don't know what neurotoxic drugs are	22	22.9	74	77.1	14	25.5	41	74.5	8	19.5	33	80.5
Patients don't want to talk about it. I don't ask questions about it either	13	13.5	83	86.5	10	18.2	45	81.8	3	7.3	38	92.7
I don't think it's a major problem	4	4.2	92	95.8	2	3.6	43	78.2	2	4.9	39	95.1

CIPN, chemotherapy-induced peripheral neuropathy.

practice is the National Cancer Institute Common Toxicity Criteria (NCI-CTS). Other diagnostic tools, which are noteworthy for their limited number, include the European Organization for Research and Treatment of Cancer QLQ-CIPN20, the Functional Assessment of Cancer Therapy/Gynecologic Oncology Group-Neurotoxicity (FACT/GOG-Ntx), the Patient Neurotoxicity Questionnaire (PNQ), the Chemotherapy Induced Neurotoxicity Questionnaire (CINQ) and the World Health Organization (WHO) scale.<sup>21,22</sup> In the study, the frequency of oncology nurses' assessments was observed to vary considerably. The rate of nurses who performed regular assessments was found to be quite low. It was determined that the lowest assessment rate of nurses was when they encountered a patient receiving neurotoxic chemotherapy, and the most frequent assessment was performed when patients reported complaints such as pain, numbness, and tingling. In our study, the educational status of the nurses was identified as a factor influencing the frequency of assessment of CIPN. When studies conducted in different countries were evaluated, which examined the practices and knowledge levels of nurses in the management of CIPN, Nijmeh, and Almutazbillah found that the rate of nurses' assessment of CIPN was 32.4%.<sup>23</sup> Smith et al. reported in their study that the frequency of assessment of CIPN by oncology nurses was higher than the frequency of assessment of nurses participating in this study.<sup>11</sup> In Wang et al. study, it was reported that the rate of nurses who reported that they did not perform regular assessments was (57.9%) and there was a need for improvement.<sup>24</sup>

The study revealed that over half of the oncology nurses frequently assessed the symptoms related to CIPN reported by cancer patients, with nearly one-fifth of them always assessing the symptoms. In the event of the development of CIPN in cancer patients, it was found that a significant proportion of nurses "frequently" and "always" assessed in many areas, particularly pain, gait and balance, fine motor skills and functional muscle strength. Social activities, deep tendon reflexes, sexual functions and neurological tests were the areas in which nurses reported that they assessed infrequently. It was observed that educational status affected the assessment status of nurses in patients with CIPN. A cross-sectional study conducted in the USA revealed that nurses lacked adequate knowledge in the assessment of CIPN and had inadequate training, expertise, and confidence in the assessment of neurological symptoms.<sup>16</sup> It was recommended that clinical guidelines and safe and appropriate working conditions should be provided for nurses when assessing CIPN.<sup>17</sup> Xue et al. reported that a significant proportion of nurses (76.4%) demonstrated inadequate skills in the assessment of CIPN.<sup>25</sup> Similarly, Tanay et al. and Selvy et al. have reported that clinicians' knowledge and understanding of the assessment and management of CIPN is limited.<sup>26,27</sup> In Turkey, it is evident that educational interventions are necessary to enhance the knowledge and awareness levels of oncology nurses regarding the assessment of CIPN. Furthermore, it was observed that the development of institutional policies, which are currently lacking in our country, and the implementation of individualized patient care plans based on a multidisciplinary and holistic approach are necessary in order to increase the limited awareness of health care professionals in the identification and management of CIPN. Given that the assessment of treatment-related symptoms is among the primary responsibilities of oncology nurses, it is believed that the utilisation of readily accessible and widely disseminated CIPN assessment tools in health centers where cancer care is provided would be beneficial. Furthermore, it is crucial for oncology nurses to strive to enhance their understanding of this subject and to conduct assessments at the outset of chemotherapy treatment and at each subsequent appointment, following evidence-based practices, to alleviate the symptom of CIPN in cancer patients.

Despite the numerous studies conducted on the treatment of CIPN, which develops due to the neurotoxic effects of chemotherapeutic agents and the cumulative dose during the treatment process, there is currently no effective approach. Pharmacological approaches such as vitamin E, calcium/magnesium supplementation, and glutamine, and non-pharmacological methods such as acupuncture, physical therapy, exercises, massage, and transcutaneous electrical nerve stimulation are generally aimed at alleviating symptoms.<sup>28,29</sup> In the study,

approximately half of the oncology nurses reported that calcium and magnesium infusions, and less than half reported that gabapentin was among the effective treatments for the prevention of CIPN. Similarly, less than half reported gabapentin, opioids, and nonsteroidal anti-inflammatory drugs among the treatments reported for pain management of CIPN. It was observed that nurses predominantly recommended physical therapy as an alternative method for the management of CIPN. The responses of oncology nurses to the practices involved in the management of CIPN are comparable to those of Smith et al.<sup>11</sup> The American Society of Clinical Oncology clinical guideline for the management of peripheral neuropathy states that no pharmacological agent is recommended for the prevention of CIPN. Furthermore, it was stated that clinicians should refrain from recommending acetyl-L-carnitine for the prevention of CIPN in patients with cancer.<sup>30</sup> In patients who develop neuropathy and/or functional impairment during treatment, it is recommended to consider options such as dose delay, dose reduction, substitution or discontinuation of chemotherapy. In patients with established painful neuropathy, duloxetine is the only agent with evidence value.<sup>30</sup> It is postulated that the absence of a radical treatment for neuropathy, the fact that the existing methods are interventions aimed at increasing symptomatic treatments and quality of life, and the necessity for further research on this subject due to the lack of high-evidence values may have influenced the response rates of oncology nurses.

The assessment of CIPN by oncology nurses in the study revealed that the nurses lacked sufficient time for assessment during the patient care process and lacked the requisite knowledge on this subject. The inability to access measurement tools for the assessment of CIPN, the inability to interpret the results of the assessment, and the lack of knowledge regarding the physical examination methods for the assessment of neuropathy were identified as significant barriers by a substantial proportion of oncology nurses, consistent with the findings of other studies.<sup>13,17,31</sup> A study of oncology nurses in Jordan revealed that the majority of nurses lacked the requisite skills to assess CIPN.<sup>23</sup> This finding aligns with the results of the present study, which similarly found that neurological physical assessment was not a common component of assessment practices. In a study by Smith et al., time constraints were identified as a significant barrier to nurses performing regular CIPN assessments.<sup>11</sup> Other barriers to the assessment of CIPN include the lack of access to appropriate, standardised measurement tools, a lack of knowledge regarding the correct assessment procedure, and the inability to interpret the results of the assessment. These findings are consistent with those of previous studies.<sup>13</sup>

The complexity and variability of the symptoms associated with CIPN, the absence of a gold standard for the assessment of CIPN, and the subjective nature of the symptoms, which vary from individual to individual, are factors that contribute to the difficulty of making diagnoses in this context. The fact that oncology nurses have sufficient knowledge and experience of this subject and have easy access to assessment tools will facilitate the recognition of the basic distinguishing features of CIPN, including the symmetrical and distal distribution of symptoms, the prevalence of sensory symptoms and their greater severity and impact than motor symptoms. Furthermore, in consideration of prior research, the utilisation of web-based applications for the surveillance of CIPN-related notifications, treatment and self-care activities among patients undergoing neurotoxic chemotherapy may facilitate the incorporation of decision support algorithms to enhance clinicians' utilisation of CIPN assessment documentation or evidence-based management strategies, thereby enhancing awareness of CIPN.<sup>32-34</sup> It is believed that the creation of professional conditions that will allow nurses to spend more time with cancer patients will have a positive impact on the professional quality of life of nurses and the care outcomes of cancer patients.

## Conclusions

This study was conducted to assess the practices of oncology nurses in the assessment and management of CIPN. The results indicated that nurses lacked the requisite knowledge and skills in this field, in line with the



findings of previous research. The inability to allocate sufficient time to patients undergoing neurotoxic chemotherapy treatment in their current working environment, a lack of confidence in making assessments, and limited access to assessment tools were identified as factors that hinder the assessment of CIPN by oncology nurses. In light of the observed correlation between nurses' education level and their assessment practices, it is imperative to implement targeted in-service training programs for oncology nurses on the assessment and management of CIPN. This should include participation in activities such as congresses, symposiums, and seminars on symptom management in oncology. In addition, it is crucial to encourage nurses to postgraduate education in order for them to professionalise in the profession, to access more comprehensive information on symptom management of cancer patients according to the nursing undergraduate curriculum, and to follow current evidence-based clinical practices and to conduct highly valid clinical research in this field. The early diagnosis of CIPN, with the appropriate assessment tools, and the improvement of quality of life by the provision of symptom management in patients with toxicity, are of great importance for the success of cancer treatment. It will contribute to the quality of life of cancer patients if oncology nurses, who are at the forefront of symptom management of cancer patients, are aware of the practices for the assessment and management of CIPN and improve their skills in this field.

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### CRedit authorship contribution statement

**Ayşegül Çelik:** Conceptualization, Methodology, Data curation, Formal analysis, Writing – Original draft, Visualization. **Öznur Usta Yeşilbalkan:** Conceptualization, Methodology, Writing – review & editing, Supervision. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

### Ethics statement

The study was approved by the Ethics Committee in Turkey (IRB No.19-45). All participants provided written informed consent.

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### Declaration of competing interest

The authors declare no conflict of interest.

### Data availability statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

### Declaration of generative AI and AI-assisted technologies in the writing process

No AI tools/services were used during the preparation of this work.

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