



# Effectiveness of an Interventional Program on Nurses' Practices about Patients with Chemotherapy-Induced Peripheral Neuropathy



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## ABSTRACT

**Aims** To evaluate oncology nurses' practices regarding chemotherapy-induced peripheral neuropathy in cancer patients and whether there is a correlation between the effectiveness of an interventional program on nurses' practices and their demographics. This study aimed to evaluate the effectiveness of an interventional program on nurses' practices regarding patients with chemotherapy-induced peripheral neuropathy.

**Materials & Methods** This quasi-experimental research was conducted with a pretest/posttest strategy, from October 28, 2021, to May 14, 2023, in Al-Habboubi Teaching Hospital. 60 nurses were selected by available sampling and were allocated into two groups; control and intervention (each 30 nurses). The data-gathering tool had two sections; demographic information of the nurses and an observation checklist for nurse practices regarding chemotherapy-induced peripheral neuropathy (27 items). The data was analyzed using SPSS 26 software by Chi-square and One-way analysis of variance.

**Findings** There was no significant difference in practice scores regarding CIPN between the control ( $1.06 \pm 0.05$ ) and study ( $1.03 \pm 0.04$ ) groups ( $t = -2.658$ ;  $p = 0.13$ ). The practice score of the study group ( $2.68 \pm 0.14$ ) was significantly ( $t = -52.145$ ;  $p < 0.001$ ) higher than that of the control group ( $1.11 \pm 0.07$ ) after the intervention. One-way analysis of variance showed no relationships between the two groups in pretest and posttest according to demographic parameters.

**Conclusion** The chemotherapy-induced peripheral neuropathy training program improves the practice of oncology nurses.

**Keywords** Effectiveness, Program; Practices; Interventional Program; Chemotherapy Induced Peripheral Neuropathy

## CITATION LINKS

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## Introduction

The most recent estimation for the total incidence of all types of cancer is 18.1 million new cases annually. Enhanced and more precise cancer treatments have increased long-term survival rates in wealthier nations [1]. This is evident in the substantial decrease of about 27% in the overall cancer mortality rate in the United States from 1991 to 2016 [2]. Various treatments such as surgical intervention, chemotherapy, radiation therapy, or combinations of these methods are frequently employed for cancer treatment [3]. Despite their efficacy, Chemotherapy-induced peripheral neuropathy (CIPN) emerges as a challenging side effect of most chemotherapy agents used in cancer treatment [4].

Contrary to nociceptive pain, which occurs when painful stimuli trigger peripheral nociceptors, neuropathic pain is not a consequence of tissue damage but rather arises from internal structural deficiencies in the peripheral neurons and sensory nerves [5, 6]. Peripheral neuropathy specifically involves the neurons forming the peripheral nerves or nerve roots. This condition gives rise to motor and sensory symptoms, including weaknesses, muscle wasting, reduced muscle tone, decreased reflexes, reduced sensation, abnormal sensations, and sensory incoordination, all of which impede an individual's daily activities and independence [6-8].

Peripheral neuropathy can be linked to various factors such as general medical conditions, infectious or inflammatory processes, metabolic factors, and hereditary factors [9]. Research suggests that around 30 to 40% of patients receiving chemotherapy experience peripheral neuropathy. The severity and persistence of these symptoms vary depending on the type and dosage of chemotherapy drugs administered, as well as individual patient characteristics. However, these symptoms often significantly diminish the quality of life for cancer patients, affecting their daily activities and adherence to crucial treatment protocols [10, 11].

However, there are reports suggesting an incidence rate of up to 60% when certain drugs such as cisplatin, paclitaxel, docetaxel, vincristine, oxaliplatin, and bortezomib are utilized [9]. These drugs belong to six primary classes that cause damage to the peripheral sensory and motor neurons, resulting in the development of Chemotherapy-Induced Peripheral Neuropathy (CIPN). The substance groups involved are the platinum-based antineoplastics, particularly oxaliplatin and cisplatin, the vinca alkaloids, particularly vincristine and vinblastine, the epothilones (specifically ixabepilone), the taxanes (paclitaxel, docetaxel), the proteasome inhibitors (bortezomib), and immunomodulatory drugs (thalidomide). The high efficacy of these drugs in treating cancer has substantially increased patient survival rates [11].

Consequently, the number of cancer survivors experiencing neuropathic pain conditions has also risen. In general, approximately 68% of patients undergoing chemotherapy develop CIPN within the first month of treatment [12]. The development of CIPN is associated with both single and cumulative drug doses. Furthermore, various conditions, such as pre-existing nerve damage, as seen in diabetic patients, may be linked to an increased risk of developing CIPN.

Though acute Chemotherapy-Induced Peripheral Neuropathy (CIPN) often resolves after chemotherapy ends, some cases persist, leading to chronic symptoms that may last for months or years. Occasionally, CIPN can even surface soon after chemotherapy completion, known as "coasting" [13]. In the broader scope of neurotoxic chemotherapy, the prevalence of CIPN declines from approximately 68% one-month post-treatment to around 60% after 3 months and 30% at 6 months or longer [11].

Presently, there's a scarcity of standard treatments for CIPN, and the commonly prescribed medication, Duloxetine, demonstrates moderate effectiveness [14]. Given its high prevalence among cancer patients and survivors, CIPN poses a significant challenge, particularly considering the absence of foolproof prevention methods and the limited treatment options available. To develop effective strategies for preventing and treating CIPN, a deeper comprehension of the underlying risk factors and mechanisms contributing to the condition is essential [15].

Nurses, often the primary caregivers for patients with CIPN, play a pivotal role in assessment, education, and support. Their practices significantly impact patient outcomes, influencing pain management, treatment adherence, and overall well-being. Therefore, there's a growing imperative to augment nurses' knowledge and skills in assessing and managing CIPN, ensuring optimal care for cancer patients.

CIPN remains a significant challenge for oncology nurses due to knowledge gaps and the absence of standardized diagnosis and management protocols. Educating nurses about CIPN is crucial, as it can profoundly influence patient treatment and quality of life. Early assessments of CIPN in cancer patients can prevent injuries and reduce complications through timely intervention and management [15].

This study aimed to evaluate the effectiveness of an interventional program on nurses' practices regarding patients with chemotherapy-induced peripheral neuropathy.

## Materials and Methods

This quasi-experimental research was conducted with a pretest/posttest strategy, from October 28, 2021, to May 14, 2023, in Al-Habboubi Teaching Hospital. 60 nurses were selected by available

sampling and were allocated into two groups; control and intervention (each 30 nurses).

The data-gathering tool had two sections; demographic information of the nurses and an observation checklist for nurse practices regarding chemotherapy-induced peripheral neuropathy (27 items). These items were rated as always (2); sometimes (1); and never (0). The scale level, which was scored as a total of three episodes of events, was observed for each respondent. Three correct practices out of three episodes were rated as always; One or two correct practices out of three are rated as sometimes and uncorrected practices are rated as never. The instrument's reliability was determined through intra-examiners (test/retest), and inter-examiners who were assessed by calculating alpha Cronbach, and the instrument validity was determined through a panel of 15 experts.

The study population participates in an interventional program to improve the nurse's practice. The program was split into three classes (each session was 60 minutes). The first session was approached on the first week of the program, and the following activities and topics were performed:

1. Introduction about the objectives of the program.
2. What is Chemotherapy-Induced Peripheral Neuropathy?
3. Significance of Chemotherapy-Induced Peripheral Neuropathy
4. Associated Cancer Types
5. Associated Agents
6. Facilitating factors
7. Broad Chemotherapy-Induced Peripheral Neuropathy Mechanisms
8. Onset of Chemotherapy-Induced Peripheral Neuropathy:

In the second session, the symptoms of CIPN and methods for assessment were performed. The third session was approached on the program's third week, and the following activities and topics were performed; Prevention of Chemotherapy-Induced Peripheral Neuropathy; Management of Chemotherapy-Induced Peripheral Neuropathy; and the Patient Education Nursing Role. The intervention program was made available to the study group, but the control group members did not have access to the interventional program.

The data was analyzed using SPSS 26 software by Chi-square and One-way analysis of variance (ANOVA).

## Findings

The mean age of the control group was  $26.33 \pm 5.75$  years, and the study group was  $26.6 \pm 3.59$  years ( $p > 0.05$ ; Table 1).

There was no significant difference in practice scores regarding CIPN between the control ( $1.06 \pm 0.05$ ) and study ( $1.03 \pm 0.04$ ) groups ( $t = -2.658$ ;  $p = 0.13$ ).

The practice score of the study group ( $2.68 \pm 0.14$ ) was significantly ( $t = -52.145$ ;  $p < 0.001$ ) higher than

that of the control group ( $1.11 \pm 0.07$ ) after the intervention.

One-way analysis of variance (ANOVA) showed no relationships between the two groups in pretest and posttest according to demographic parameters (Table 2).

**Table 1.** Comparing the distribution of the research groups according to demographic parameters

Parameter	Control group		Study group		p Value
	No.	%	No.	%	
Age Groups (years)					
20-24	4	13.4	2	6.7	$\chi^2=5.313$ p=0.153
25-29	13	43.3	17	56.7	
30-34	8	26.7	8	26.6	
35-39	4	13.3	2	6.7	
40-44	1	3.3	1	3.3	
Gender					
Male	22	73.3	21	70.0	CC=0.001 p=0.999
Female	8	26.7	9	30.0	
Educational Level					
Nursing school	6	20.0	1	3.3	$\chi^2=16.918$ p=0.091
Diploma	16	53.3	21	70.0	
Bachelor	7	23.4	7	23.4	
Master and up	1	3.3	1	3.3	
Employment in the nursing field (years)					
1-5	4	13.3	6	20.0	$\chi^2=3.403$ p=0.803
6-10	18	60.0	18	60.0	
11-15	5	16.7	4	13.3	
16-20	3	10.0	2	6.7	
Training course					
Yes	30	100	30	100	CC=0.316 p=0.092
No	0	0	0	0	
Number of training courses					
<3	16	53.3	19	63.3	$\chi^2=0.21$ p=0.947
3-5	12	40.0	10	33.3	
5<	2	6.7	1	3.3	

**Table 2.** ANOVA results concerning nurses' practice between study groups (pre- and posttest) according to demographic parameters

Parameter		Sum of Squares	df	Mean Square	F	Sig.
Age	Pretest	6.054	5	1.211	1.239	0.322
	Posttest	14.033	13	1.079	1.117	0.411
Gender	Pretest	1.914	5	0.383	2.325	0.074
	Posttest	3.317	13	0.255	1.601	0.185
Education level	Pretest	4.111	5	0.822	1.567	0.207
	Posttest	4.983	13	0.383	0.523	0.878
Employment as nurse	Pretest	5.539	5	1.108	1.923	0.128
	Posttest	6.317	13	0.486	0.596	0.824
Number of Training	Pretest	0.782	5	0.156	0.351	0.876
	Posttest	5.767	13	0.444	1.245	0.334

## Discussion

Nurses play a critical role in evaluating and managing Chemotherapy-Induced Peripheral Neuropathy (CIPN) to alleviate its adverse effects on a patient's Life. Insufficient research on nurses' knowledge and viewpoints about CIPN poses a challenge in determining if nurses are adequately prepared for this role. This study aimed to evaluate the effectiveness of an interventional program on nurses' practices regarding patients with chemotherapy-induced peripheral neuropathy.

This outcome aligns with various studies that aimed to assess the impact of training programs on improving how nurses handle CIPN. For instance, Al-

Atiyyat & Banifawaz noted knowledge gaps among oncology nurses regarding CIPN, emphasizing the lack of training, expertise, and confidence in neurologic physical assessment [12]. Their study proposed that evidence-based educational initiatives covering CIPN prevention and treatment, alongside formulating guidelines for managing CIPN, could significantly enhance nurses' knowledge and practical skills. Mousa Mohammed *et al.* [16] determined that nursing guidelines positively influenced nurses' practices in chemotherapy-induced peripheral neuropathy. Similarly, Qalawa [17], Ahmed Sohail *et al.* [18], and Sadiq *et al.* [19] identified a notable correlation between nurses' knowledge and their practices concerning CIPN. Consequently, Qalawa [17] recommended organizing educational workshops for nurses, particularly focusing on neurological tests, especially those related to chemotherapy and emphasized the importance of regular follow-ups to evaluate peripheral neuropathy in chemotherapy patients.

The findings of this study showed no significant relationship between the demographic variables and nurses' practices regarding CIPN. In accordance with this finding, Toftthagen *et al.* [20], regarding CIPN assessment recommendations and practice guidelines, also found no notable association between nurses' practices and their demographic traits. Their review stressed the importance of non-pharmacological interventions, encompassing sensorimotor training, whole-body vibration, sports therapy, occupational therapy, physiotherapy, and electrotherapy.

Similarly, Al-Atiyyat & Banifawaz highlighted that among oncology nurses, knowledge, practices, and confidence in dealing with CIPN were not linked to demographic characteristics like age, gender, years of experience, or educational level [15]. In line with these findings, Ali Mohammed *et al.* [21] examined nurses' knowledge and practice behaviors concerning chemotherapy's impact on peripheral neuropathy and the relationship between this knowledge and demographic traits. They found no statistically significant link between nurses' knowledge and demographic characteristics, except for years of experience [21].

Another study conducted in Baltimore, MD, investigated oncology nurses' practices and knowledge of CIPN in patients with cancer, revealing that nurses' understanding and practices related to CIPN were not tied to their demographic characteristics [22]. Moreover, Fan *et al.* [23] investigated oncology nurses' experiences caring for CIPN patients in China. They concluded that the challenges in managing CIPN were primarily influenced by individual and environmental factors rather than the nurses' demographic characteristics. Overall, as demonstrated by the results of this study, providing training and enhancing the knowledge and awareness of nurses affect their practices regarding

patients with chemotherapy-induced peripheral neuropathy. However, the demographic characteristics of nurses did not impact their practices. So, it's suggested that comprehensive training modules and workshops should be developed on CIPN, covering its symptoms, management strategies, and the latest evidence-based practices. Include case studies and real-life scenarios to enhance nurses' understanding and practical application.

## Conclusion

The chemotherapy-induced peripheral neuropathy training program improves the practice of oncology nurses.

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**Ethical Permissions:** Before carrying out the research, consent on an ethical level was acquired by the scientific study's ethics council of the college of nursing at University of Baghdad. The researcher meted to the participants to discuss the objectives of the research and get their consent.

**Conflicts of Interests:** The authors have no conflicts of interest to declare for this study.

**Authors Contribution:** Hameed AT (First Author), Introduction Writer/Methodologist/Main Researcher (70%); Bakey SJ (Second Author), Data Analyst/Assistant Researcher/Discussion Writer (30%)

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