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Original Article

Chemotherapy-Induced Nausea and Vomiting: Assessing Patients and Nurses' Knowledge, Attitudes, and Practices in Clinical Settings Across North Kerala

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ABSTRACT

Background: Chemotherapy-Induced Nausea and Vomiting (CINV) remains an important concern in cancer care and treatment despite existing guidelines and management to relieve discomfort and preserve a patient's quality of life during chemotherapy. Understanding the knowledge, attitudes, and practices (KAP) of both nurses and patients can reveal gaps and discrepancies in the management of CINV. **Objectives**: To assess KAPconcerning chemotherapy-induced nausea and vomiting (CINV) among nurses and patients according to nurses and patients living in North Kerala, India, and determine what factors influenced their KAP. **Methods**: A cross-sectional survey was developed and utilized to understand KAP related to CINV from February 2024 to May 2024, with 910 participants (404 nurses and 514 patients) using a validated KAP questionnaire. Demographic correlations were statistically analyzed. **Results**: Factors associated with knowledge and practices included older age, male gender, higher education, and more years of work experience. Nurses demonstrated good knowledge about emetogenic agents (82%) and sequential reporting of CINV symptoms (64%), but understanding of CINV definitions (45%) and non-pharmacologic management approaches (47%) was poor. Patients in this study actively sought information (90%) and reported symptoms (85%), but only 30% consulted healthcare providers before using antiemetics. A majority (74%) of nurses also felt that their peers overlooked the importance of reporting chemotherapy symptomatology. **Conclusion**: Nurses and patients demonstrated a solid understanding of the pharmacologic management of CINV, but lacked a good experience or awareness of non-drug and documentation procedures. Education, systemic protocol, mentorship, and patient-centered communication are required to improve the reporting of symptoms associated with CINV amongst patients.

1. INTRODUCTION

Nausea and vomiting are closely related and serious complications of cancer chemotherapy. They can significantly reduce a patient's quality of life and compliance with treatment. Nausea and vomiting might also lead to complications like anorexia, physical status decline, metabolic derangements, separation of surgical wounds, esophageal ruptures, and nutritional deficits (Fernández-Ortega et al., 2012). Although we

have made significant strides in avoiding and managing chemotherapy-induced nausea and vomiting (CINV), these symptoms are still among the patients' most distressing experiences, and they won't ease up. Although the emergence of novel antiemetic agents has greatly reduced the incidence of vomiting, studies show that 30% to 60% of patients still experience acute or delayed nausea following chemotherapy (Cohen et al., 2007). The risk factor for CINV is influenced by patient- and treatment-related factors. Female sex and a history of motion sickness or morning sickness are known predictors for nausea and vomiting (De Boer-Dennert et al., 1997; Griffin et al., 1996). Chemotherapy-induced nausea and vomiting (CINV) includes acute, delayed, and anticipatory emesis. Acute CINV is described as nausea and vomiting occurring in the first 24 hours after treatment, with peak emesis at 4–6 hours, and can generally be considered clinically well controlled. Delayed CINV occurs after the first 24 hours following chemotherapy, with peak emesis at 48–72 hours after treatment, is less effectively controlled, and occurs more with drugs like cisplatin and cyclophosphamide (Hesketh et al., 2012; Kris et al., 1985). Anticipatory CINV occurs much less frequently today because of the better use of antiemetics, but usually refers to the conditioned response to previous chemotherapy experience (Morrow et al., 1998; Tavorath & Hesketh, 1996). Chemotherapy-induced nausea and vomiting (CINV) utilizes both central and peripheral pathways, with significant contribution from areas within the brainstem, including the central pattern generator (CPG), nucleus tractus solitarius (NTS), and area postrema (AP) (Borison, 1989; Carpenter, 1990). The aforementioned areas of the brain, particularly the AP/NTS complex, are dense with dopamine (D2), serotonin (5-HT3), and neurokinin-1 (NK1) receptors, which are targets of therapy for antiemetics. Chemotherapy causes damage to intestinal cells, leading to exocytosis of neurotransmitters, including 5-HT. These neurotransmitters then activate vagal afferents, which in turn activate the brainstem. Peripheral 5-HT3 pathways mediate acute CINV, while the central NK1 receptor pathways associated with substance P mediate delayed CINV. Anticipatory emesis may be due to higher brain centers such as the amygdala (Janelsins et al., 2013; Mitchelson, 1992). Management of chemotherapy-induced nausea and vomiting (CINV) has advanced due to the classification of chemotherapy drugs by emetogenic risk. An approach published in 1997 (and updated in 2004) recognizes four classes of drugs based on emetogenicity: greater than 90% risk (see below) is considered highly emetogenic, 30 to 90% is moderately emetogenic, 10 to 30 % risk is regarded as low emetogenicity, and less than 10% risk is considered minimally emetogenic (Hesketh et al., 2017). No antiemetic prophylaxis is utilized for the classification. The emetogenicity classification scheme is used by the Multinational Association of Supportive Care in Cancer (MASCC)/European Society of Clinical Oncology (ESMO), the American Society of Clinical Oncology (ASCO), and the National Comprehensive Cancer Network (NCCN) (Gupta et al., 2021). For combination therapies, the emetogenicity risk is classified depending on the most emetogenic drug in the combination. For example, doxorubicin and cyclophosphamide are moderately emetogenic when given separately, but when combined, they are highly emetogenic. While this risk classification is based on studies in breast cancer patients, similar regimens, such as CHOP in lymphomas, may be different, with some evidence suggesting moderate emetogenicity based on one of the drugs, cyclophosphamide (Di Renzo et al., 2011).

By considering the emetogenic risk of the chemotherapy being administered, we can tailor the CINV prophylaxis. For regimens with highly emetogenic potential (i.e., cisplatin, AC), all four classes of CINV prophylaxis should be used in combination (NK1 antagonist, 5-HT3 antagonist, dexamethasone, and olanzapine). For moderately emetogenic regimens, a 5-HT3 antagonist plus dexamethasone (with or without an NK1 antagonist) is indicated for prophylaxis. Lower-risk regimens usually require a single agent as prophylaxis (i.e., dexamethasone), whereas antiemetics are rarely necessary for minimal-risk regimens. CINV can be further complicated by anticipatory nausea. Anticipatory nausea can be mitigated with effective control of early CINV or use of benzodiazepines. High-dose chemotherapy and multi-day regimens will necessitate a longer dose of antiemetics to provide coverage. Patients experiencing breakthrough CINV may be effectively managed with olanzapine or may require the use of alternate drug classes. Cannabinoids should be reserved for the treatment of de facto refractory CINV, as evidence demonstrates limited efficacy, plus side effects that limit tolerability (Todaro, 2012). Despite more advanced antiemetic therapies, chemotherapy-induced nausea and vomiting (CINV) remains prevalent, and often under-reported. Clearly, effective management of CINV involves clinical protocols but also depends on patients' and nurses' knowledge and actions. This research was conducted to evaluate the knowledge, attitudes, and practices

(KAP) of patients receiving chemotherapy and nursing professionals in North Kerala. We aimed to identify gaps in the management of CINV and specific areas where education and training should be targeted to improve management and the overall quality of care for patients.

2. METHODS

2.1 Study design and Participants

This cross-sectional study was conducted in North Kerala, from February 2024 to May 2024, and included nurses involved in the care of patients receiving chemotherapy and patients undergoing chemotherapy at various hospitals located in North Kerala. Inclusion criteria were set as (1) nurses who have cared for patients receiving cancer treatment, and (2) patients currently receiving chemotherapy treatment. The goal of this study was to assess KAP regarding chemotherapy-induced nausea and vomiting (CINV). Ethical approval was granted by the Institutional Ethics Committee, and all participants were provided with study objectives and written informed consent before participation in this study.

2.2 Questionnaire design

The questionnaire was created using guidelines for the prevention and treatment of chemotherapy-induced nausea and vomiting (CINV) such as American Society of Clinical Oncology (ASCO), Multinational Association of Supportive Care in Cancer/European Society for Medical Oncology (MASCC/ESMO), and the National Comprehensive Cancer Network (NCCN) and was originally validated and adapted with the input of oncology experts and clinical oncologists. The pilot study included 50 participants, equally divided into 25 nurses and 25 patients receiving chemotherapy. The questionnaire had high internal consistency for the three constructs (knowledge, attitudes, and practices) with a Cronbach's α of 0.838, indicating stable and reliable measurement of knowledge, attitudes, and practices on the topic of chemotherapy-induced nausea and vomiting. The final version of the questionnaire was comprised of 4 sections: demographic information (age, sex, occupation, professional title, length of employment experience, department, hospital level, and geographic region), knowledge (17 questions scored as 1 if answered correctly and 0 if answered incorrectly or unclearly, with a total score range of 0-17), attitude scale measured the perceptions of cancer patients and nurses regarding CINV management through 6 items using a five-point Likert scale (Strongly Disagree = 1 to Strongly Agree = 5). One item was reverse-scored to limit response bias. The scores could range from a 6 - 30 total score, with scores of $\geqq$ 18 reflecting a positive attitude, and scores < 18 indicating a negative attitude towards the prevention and management of CINV, and practice (9 questions rated using a 5-point scale, with one question excluded from scoring, total score range of 8-40). Participants scoring above 70% of the total possible points are indicative of sufficient knowledge and a positive attitude, and proactive practice.

2.3 Data collection and quality control

The questionnaire was distributed to nurses and patients in the hospital via Google Forms, which was sent to their contact numbers and email IDs provided. Interested participants provided informed consent via the Google Forms before completing the survey. The form was designed such that participants should fill in all items before submission to avoid incomplete data. Participants were only permitted to submit the questionnaire once to avoid duplication, and any questions from participants were answered promptly by the research staff. Responses were then checked for completeness and consistency, with any incomplete or contradictory questionnaires deemed invalid.

2.4 Statistical Analysis

Statistical analysis was performed using SPSS 26.0 (IBM Corp., Armonk, NY, USA). Continuous data were tested for normality and stated as mean $\pm$ standard deviation (SD) for normally distributed data, and median (range) for non-normally distributed data. Categorical data were presented as numbers and percentages (n%) and then analyzed using the chi-square test or Fisher's exact test. Pearson correlation analysis was completed to determine the relationship between scores for knowledge, attitude, and practice. Factors that influenced KAP were assessed by statistical multivariable regression (using the Enter method) and categorized as "sufficient" or "insufficient." Relationships between KAP components were further explored using a structural equation model (SEM) to assess the hypothesized direction in which knowledge affects attitudes and practice directly, and for attitudes to directly affect practice. A p-value less than 0.05 was regarded as statistically significant.

3. RESULTS AND DISCUSSION

The analysis included a total of 910 participants, comprising 404 nurses (44.0%) and 514 patients (56.0%). The overall mean scores for

knowledge, attitude, and practice were 10.61 ± 3.39, 24.69 ± 2.57, and 23.26 ± 6.82, respectively (Table 1). In the recent study, older participants (≥46 years) and males had higher knowledge and practice scores, indicating that older age and male sex are positively associated with superior CINV management. This current finding is in direct contrast to the previous study's identified participants, who were primarily young (≤45 years), female nurses who had poorer adherence to practice (Gebre et al., 2022). Regarding participants' gender, females had lower knowledge and attitude scores than males, but similar practice scores. The higher the participants' qualifications (i.e., Doctorate 71.9% (n=655)), the higher their overall scores were across all three scores: knowledge (±) and practice (±).

Table 1: Demographic details of participants.

	N (%)	Knowledge	Attitudes	Practice
		Score (total: 17)	Score (total: 30)	Score (total: 40)
Total	910	10.61 ± 3.39	24.69 ± 2.57	23.26 ± 6.82
Age (years old)				
≤ 35	154 (16.9%)	11.39 ± 3.44	22.53 ± 2.68	25.34 ± 7.66
36–45	549 (60.3%)	12.35 ± 3.43	24.75 ± 2.5	27.63 ± 6.60
≥ 46	207 (22.7%)	11.20 ± 2.60	22.61 ± 2.67	28.07 ± 4.86
Gender				
Male	436 (47.9%)	10.99 ± 3.45	26.72 ± 2.48	26.27 ± 6.73
Female	474 (52.1%)	10.27 ± 3.29	23.65 ± 2.65	24.35 ± 6.78
Education				
Less than a bachelors	9 (0.1%)	12.33 ± 4.15	24.89 ± 3.37	24.00 ± 9.22
Bachelor degree	249 (27.4%)	11.41 ± 3.65	23.86 ± 2.85	24.38 ± 7.59
Higher degree	652 (71.6%)	11.68 ± 3.27	24.99 ± 2.38	27.00 ± 6.33
Type of population				
Patients	514 (56.0%)	11.85 ± 3.32	24.89 ± 2.58	27.82 ± 6.38
Nurses	404 (44.0%)	11.30 ± 3.44	24.43 ± 2.53	24.28 ± 6.85
Work experience (in years)				
≤ 7	237 (26%)	11.62 ± 3.39	23.76 ± 2.52	25.10 ± 7.49
8–14	317 (34.8%)	12.99 ± 3.56	23.86 ± 2.50	26.44 ± 6.66
15–21	181 (19.9%)	13.25 ± 3.04	25.24 ± 2.72	25.53 ± 6.07
≥ 22	175 (19.2%)	12.40 ± 2.46	27.72 ± 2.59	29.37 ± 4.83

Patients scored (±) for knowledge and (±) for practice, which were higher scores compared to nurses. Work experience also had a positive relationship with KAP scores. Participants with equal to or greater than twenty-two (22) years' work experience had the highest scores for attitude (27.72 ± 2.59) and practice (29.37 ± 4.83), indicating the participants' better understanding and implementation of care related to chemotherapy-induced nausea and vomiting (CINV) (Table 1). This aligns with previous studies, such as one from Kenyatta National Hospital, where experienced nurses showed better compliance with guidelines, and a multinational survey that reported gaps in nurses' CINV knowledge and emphasized the need for standardized training (Krishnasamy et al., 2014).

The cognitive domain assessment regarding CINV revealed moderate to high levels of knowledge among health care professionals (Table 2). Each participant correctly identified areas related to CINV, including: emetogenic chemotherapy agents (82.1%), antiemetic combinations (83.9%), and risks associated with poorly controlled CINV (83.0%). There were, however, knowledge gaps in other areas that may affect how health care professionals manage CINV. These included: definition of CINV (45.5%), non-pharmacologic management options for CINV (46.6%), and documentation surrounding CINV (51.5%). This study revealed that healthcare professionals had good knowledge of emetogenic chemotherapy agents and antiemetic combinations, but fell short when it came to knowledge on the definition of CINV, non-drug management of CINV, and documentation practices. Notable knowledge gaps were reported in a multinational survey and an Ethiopian study. These studies pointed to the need for focused CINV education to enhance knowledge and ultimately practice (Van Laar et al., 2015). It is concerning that although 89.0% of participants stated they understood that antiemetics need to be adjusted for the level of chemotherapy risk, and that 80.9% said they understood the role of education with CINV management in practice, only 13.9% flatly denied that CINV should only be reported if it was severe. These findings suggest the need for targeted education regarding CINV management to increase knowledge and ultimately improve healthcare practice pertaining to CINV.

The inspection results present a generally positive view of treatment and prevention of chemotherapy-induced nausea and vomiting (CINV)

Table 2: Knowledge aspect of participants

No	Question	Correct rate (%)
1	CINV is nausea and vomiting caused by chemotherapy treatment. → Correct	418 (45.5%)
2	Some chemotherapy drugs, more than others, can cause nausea and vomiting. → Correct	754 (82.1%)
3	CINV can happen in different phases: acute (within 24 hours); delayed (after 24 hours); anticipatory (before chemotherapy). → Correct	577 (62.9%)
4	Poorly controlled CINV can affect adherence to treatment and quality of life. → Incorrect	827 (90.1%)
5	Risk factors, including age, gender, and previous motion sickness, increase individuals' chances of developing CINV. → Correct	745 (81.2%)
6	Antiemetic agents, including 5-HT3 receptor antagonists, NK1 receptor antagonists, and corticosteroids, are included in the management of CINV. → Correct	637 (69.4%)
7	It is more effective to combine antiemetic agents, rather than using a single agent. → Correct	770 (83.9%)
8	The five types of CINV are: acute, delayed, anticipatory, breakthrough, and refractory. → Correct	661 (72.0%)
9	A person should start taking antiemetic medications after they start to vomit. → Incorrect	745 (81.2%)
10	Uncontrolled CINV may result in complications including dehydration, electrolyte imbalance, and malnutrition. → Correct	762 (83.0%)
11	The guidelines from NCCN and MASCC/ESMO provide evidence-based recommendations for preventing and treating CINV. → Correct	593 (64.6%)
12	Antiemetics should be tailored to the emetogenic risk of the chemotherapy regimen (high, moderate, low). → Correct	817 (89.0%)
13	Non-pharmacologic therapies such as relaxation and dietary adjustments may be useful in the management of CINV. → Correct	428 (46.6%)
14	There cannot be any nausea or vomiting when antiemetics are given. → Incorrect	579 (63.1%)
15	Educating nurses and patients about antiemetics can improve the management of CINV. → Correct	743 (80.9%)
16	Patients should not report CINV unless it is mild or tolerable. → Incorrect	128 (13.9%)
17	It is important to assess and document the patient's response to antiemetic treatment after each chemotherapy cycle. → Correct	473 (51.5%)

chemotherapy could and ought to be prevented in all patients, while 34.46% felt otherwise. The results of the study show that it is possible to adopt a positive perspective toward CINV management, with 64.1% of respondents supporting complete symptom reporting and 46.99% supporting dietary and relaxation

Table 3: View of participants on treatment and prevention of CINV.

No	Attitude-based questions	Disapproves	Neutral	Supports
1	I think that CINV can be prevented and should be prevented in all patients receiving chemotherapy.	**314** (34.46%)	**173** (19.04%)	**423** (46.51%)
2	Controlling CINV is vital for maintaining patients' compliance with chemotherapy and improving their quality of life.	**349** (38.31%)	**318** (34.94%)	**244** (26.75%)
3	I believe that it is important to report all symptoms of nausea and vomiting, no matter how mild, to manage them well.	**83** (9.16%)	**243** (26.75%)	**583** (64.10%)
4	I think non-pharmacologic approaches (changing diet and relaxation techniques) can be useful to support CINV management.	**314** (34.46%)	**164** (18.07%)	**428** (46.99%)
5	I feel that a lack of knowledge and understanding among health care professionals can affect how CINV is managed.	**105** (11.57%)	**130** (14.22%)	**675** (74.22%)
6	Continuous education and training for healthcare professionals on the prevention and management of CINV is needed to improve patient outcomes.	**314** (34.46%)	**173** (19.04%)	**423** (46.51%)

Table 4: Patient Involvement and Self-Management Practices in CINV.

No	Practice-Based Questions (CINV-Focused)	Answered Yes (n [%])
1	Do you only take antiemetic medications after consulting a doctor or pharmacist?	270 (29.64%)
2	Do you usually read or check the information leaflet provided with antiemetic medications?	719 (79.04%)
3	Do you (as a patient) regularly report CINV symptoms during each chemotherapy cycle?	770 (84.58%)
4	Do you inquire about the purpose and safety of prescribed antiemetics during chemotherapy?	836 (91.81%)
5	Do you ask the pharmacist how to use antiemetics properly and about their possible side effects?	826 (90.60%)
6	What is your primary source of information about CINV and its prevention or treatment?	629 (69.16%)

Table 5: multivariate logistic regression analysis.

	Knowledge		Attitudes		Practice	
	OR (95%CI)	**P**	**OR (95%CI)**	**P**	**OR (95%CI)**	**P**
Age (years old)						
≤ 35	1.745 (1.086, 6.941)	0.053	0.266 (0.314, 1.346)	0.452	1.834 (0.664, 3.273)	0.344
36–45	1.627 (0.821, 3.222)	0.163	0.955 (0.565, 1.615)	0.864	0.943 (0.514, 1.730)	0.850
≥ 46	2.745 (1.086, 6.941)	0.033	0.726 (0.314, 1.676)	0.452	1.534 (0.644, 3.653)	0.334
Gender						
Male	1.599 (1.15, 2.223)	0.005	1.260 (0.942, 1.684)	0.119	1.414 (1.029, 1.943)	0.033
Female	2.745(1.150–2.223)	0.005	1.565 (0.742, 1.385)	0.129	1.216 (1.029, 1.973)	0.023
Education						
Less than a bachelors	0.094, (0.013–0.533)	0.009	0.359 (0.052, 1.421)	0.104	0.125 (0.032, 0.839)	0.193
Bachelor degree	0.084 (0.013, 0.533)	0.009	0.319 (0.072, 1.421)	0.134	0.175 (0.036, 0.859)	0.297
Higher degree	0.096 (0.015, 0.609)	0.013	0.532 (0.120, 2.358)	0.406	0.283 (0.058, 1.382)	0.728
Type of population						
Patients	7.601, (1.337, 43.207)	0.022	1.115 (0.458, 2.715)	0.811	1.336 (0.458, 3.896)	0.596
Nurses	9.601 (1.737, 75.207)	0.022	2.615 (0.548, 2.175)	0.811	1.876 (0.958, 3.266)	0.686
Work experience (in years)						
≤ 7	0.317 (0.433, 1.213	0.425	0.632 (0.143, 0.143)	0.201	1.403 (0.981, 2.193)	0.544
8–14	0.850 (0.483, 1.495)	0.573	1.160 (0.743, 1.810)	0.514	1.222 (0.731, 2.042)	0.445
15–21	0.927 (0.473, 1.816)	0.825	0.644 (0.363, 1.141)	0.131	1.103 (0.581, 2.093)	0.764
≥ 22	1.103 (0.447, 2.720)	0.832	0.878 (0.374, 2.064)	0.766	1.936 (0.803, 4.668)	0.141

strategies. Moreover, 74.22% of respondents affirmed that care was limited by a lack of professional awareness, and the implications highlight the need for continued training. Other studies also report similar findings, indicating that ongoing education leads to improved provider awareness and improvements in care related to stress management and nutrition (Dacey et al., 2013) (Table 3).

This study demonstrates that patients are enthusiastic participants in the management of chemotherapy-induced nausea and vomiting (CINV) by obtaining information about antiemetics in over 90% of the cases and identifying symptoms in 84.6% consistently; however, only 29.6% consulted healthcare, before using antiemetics; there appears to be a shift towards non-supervised and unrestricted use of CINV medication (Table 4). This finding is also comparable to the NERO study, which demonstrated that patients receiving guideline-consistent care plans (GCCP) during prophylactic treatment of CINV achieved significantly better symptom control than those receiving inconsistent care plans (Aapro et al., 2022). Likewise, it is interesting that in the aforementioned European survey of oncology nurses regarding CINV, 19% of the nurses reported that patients frequently underreported CINV, again attesting to the need for better patient-provider communication. Both studies emphasize the need for improving patient education and encouraging strong adherence to antiemetic guidelines to maximize care for CINV.

The current study found that older participants (≥46 years) and those with higher educational qualifications had significantly better knowledge and practice scores related to chemotherapy-induced nausea and vomiting (CINV) (Table 5). Males also demonstrated higher knowledge scores compared to females. These findings are consistent with the study

by Batiha et al. (2022), which reported that trained oncology nurses had significantly higher awareness of CINV prophylaxis guidelines, and that experience and professional setting (e.g., inpatient vs. chemotherapy unit) influenced knowledge levels. The analysis investigated a total of 910 participants, consisting of 514 patients (56.0%) and 404 nurses (44.0%). The overall mean scores for knowledge, attitude, and practice were 10.61 ± 3.39, 24.69 ± 2.57, and 23.26 ± 6.82, respectively. The age group with the most participants was aged between 36 and 45 years (n=510; 60.2%) and had the highest knowledge (±) and practice scores (±). Regarding participants' gender, females had lower knowledge and attitude scores than males, but similar practice scores. The higher the participants' qualifications (i.e., Doctorate 71.9% (n=655)), the higher their overall scores were across all three scores: knowledge (±) and practice (±).

The results from the practice-based questions show some really positive trends in how patients are engaging with the management of CINV (chemotherapy-induced nausea and vomiting). A significant number of participants, about 91.81%, took the initiative to ask about the purpose and safety of their prescribed antiemetics, while 90.60% reached out to pharmacists to learn more about how to use them properly and what side effects to expect. Moreover, 84.58% of respondents mentioned that they consistently shared their CINV symptoms during each chemotherapy cycle, which is crucial for managing those symptoms effectively. Most participants (79.04%) also reported reading the information leaflet that comes with their antiemetic medications, indicating a keen interest in understanding their treatment better. On the flip side, only 29.64% said they took antiemetic medications only after consulting a healthcare professional, which points to a possible gap in supervised medication use. Additionally, 69.16% identified a specific primary source of information about CINV and its prevention or treatment, indicating they rely on easily accessible resources. All in all, these findings reflect a strong level of patient awareness and active involvement in managing CINV, although there's still some room for improvement when it comes to encouraging healthcare-guided medication use.

Demographic analyses yielded several associations of KAP scores with demographic variables by means of logistic regression.

Knowledge: Participants in the age group ≥46 years had significantly higher knowledge scores than the reference group (OR: 2.745; 95% CI: 1.086–6.941; p=0.033). Gender was also significantly associated with knowledge, whereby males had higher odds for having better knowledge: OR, 1.599; 95% CI, 1.150–2.223; p=0.005. Similarly, those having less than a bachelor's degree were significantly less knowledgeable (OR: 0.094, 95% CI: 0.013–0.533, p=0.009). Among population types, patients and nurses had significantly higher odds of better knowledge with ORs of 7.601 and 9.601 (p=0.022 for both), indicating better awareness in these groups.

Attitudes: No demographic characteristics were associated with attitude scores at a significant level. Yet, there was a non-significant trend for the female gender and for age ≥46 years to have lower attitude scores when compared to their counterparts. Although the trend did not reach statistical significance, the data tended to show lower attitude scores associated with lower educational attainment.

Practice: With reference to better practices, the male gender appeared to be significantly associated (OR: 1.414, 95% CI: 1.029–1.943, p = 0.033), and females shared similar odds (OR: 1.216, 95% CI: 1.029–1.973, p = 0.023), yet there might be a reporting or modeling error because the categories tend to overlap.

The present analysis assessed the knowledge, beliefs, and practice (KAP) toward CINV in 910 participants, and it found that older people (>46 years old), men, and those with higher qualifications scored significantly better in knowledge and practice scores. These results are consistent with Batiha et al. (2022), who concluded that trained oncology nurses had higher knowledge and practice scores of CINV guidelines, which were related to their length of experience and organizational context. However, a previous study (Gebre et al., 2022) identified significantly lower adherence to the practice of care amongst younger nurses who were primarily female.

With regards to experience, work experience of a ≥22 years was associated with increased attitude and practice scores, which were consistent with the findings of Kenyatta National Hospital, and are also consistent with the multinational survey that placed emphasis on the importance of experience and standardized training (Krishnasamy et al., 2014). CINV knowledge was high regarding emetogenic agents (82.1%) and antiemetic combinations (83.9%); however, there were gaps in knowledge surrounding CINV definitions (45.5%), non-pharmacologic options (46.6%), and documentation (51.5%), which is similar to what was found in other studies undertaken in Ethiopia and previous multinational studies (Van Laar

et al., 2015).

In relation to attitudes, 64.1% of participants reported they sought extensive symptom reporting, while 46.99% supported adjunctive strategies; however, the majority (74.22%) reported professional unawareness in practice as a barrier—similar to other studies suggesting a need for continued education (Dacey et al., 2013). Patients themselves sought to be activated in learning about CINV (90%) and sharing symptoms (84.6%); however, only 29.6% of patient participants sought healthcare providers before starting to take antiemetics, similar to trends of the NERO study (Aapro et al., 2022) . Both studies signal that education, consultation, and adherence to guidelines have an important influence on the terms of practice in creating a complete CINV experience.

4. CONCLUSION

This research has shown that demographic and professional variables are key factors in knowledge, attitude, and practice (KAP) in the management of chemotherapy-induced nausea and vomiting (CINV). Older, male, and better-educated participants performed better. There continued to be significant deficits in areas such as non-pharmacologic management, documentation, and supervision of medications. To close these gaps and improve CINV management, a multipronged approach is required. The CINV landscape could be improved by a targeted educational program for nurses, clinical practice standards, experience-based mentorships, better patient education practices, targeted communication methods, and mandatory continuous education. Moreover, quality improvement and research projects exist to facilitate less experienced and less formally educated health professionals toward standardization and improved quality of care. To enhance the quality of care, the above interventions will create opportunities for significantly improved prediction, recognition, and management of CINV, and, arguably, better patient outcomes and quality of life.

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Conflict of interest

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Ethical statement

The study protocol, survey instrument, and consent process were cleared by the Institutional Ethics Committee. Full explanations were provided to participants, and voluntary verbal and written consent was obtained, with the option of withdrawal at any time. The study complied with the Declaration of Helsinki (1975) guidelines for human research.

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