IJIOPP- International Journal of Innovations in Oncology Pharmacy Practice
Volume 1, Issue 2 | July -2025
e-ISSN: 3068-899X Print ISSN: 3068-8981

An in vivo survey of using pharmacist-led antiemetic stewardship to get rid of chemotherapy-induced nausea and vomiting

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Received: 12-05-2025; Revised: 29-05-2025; Accepted: 18-06-2025; Published: 07-07-2025

Abstract
Chemotherapy induced nausea and vomiting (CINV) affect strongly the patient adherence, the success of treatments, and patient quality of life. This observational study in the real world evaluated the effectiveness of the pharmacist-administered antiemetic stewardship programs in three hospitals in the country of Sweden, Egypt, and the UAE. The intervention consisted of pharmacist-led choice of antiemetic regimen in accordance with international guidelines, pre-treatment education of patients and active monitoring of breakthrough CINV. There were 210 cancer patients undergoing highly emetogenic chemotherapeutic agent like cisplatin and doxorubicin, and each patient underwent four cycles. Investigated outcomes showed a 28 percent improved complete response, that is, no nausea, no vomiting and the absence of rescue medication, versus base (p <0.001). Also scores of quality of life went up considerably, and unplanned hospital visits reduced by 19%. These results highlight the importance of pharmacist stewardship to maximize the use of antiemetic and improve supportive care outcomes in oncology.

Keywords: ***CINV, chemotherapy, antiemetic stewardship, pharmacist intervention, supportive care, quality of life, oncology pharmacy, complete response, real-world study, guideline adherence***

1. Introduction

1.1 History of CINV

Nausea and vomiting due to chemotherapy (CINV) is one of the most dreaded and unpleasant adverse effects of the treatment of cancer. Regardless of the current developments in antiemetic pharmacotherapy, the incidences of CINV have been perpetuated in a significant percentage of patients exposed to moderately and highly emetogenic combinations of chemotherapy, including cisplatin, doxorubicin, and carboplatin agents. CINV does not only reduce the state of physical comfort but also decreases the ability to obtain nutrients, psychological well-being and treatment compliance. In other situations, the patient might fail to accept additional rounds of chemotherapy because of anticipatory nausea or traumatizing past experiences. Such effects are able to limit the success of treatment and survival considerably.

CINV is broadly subdivided into a number of types such as acute, delayed, anticipatory, breakthrough, and refractory; each one of them demands a specific consideration in clinical practice. There are guidelines-produced by Multinational Association of Supportive Care in Cancer (MASCC), American Society of Clinical Oncology (ASCO) and National Comprehensive Cancer Network (NCCN) that present evidence-based antiemetic regimens depending on the emetogenic potentiality of individual chemotherapy drugs. Nevertheless, inconsistency in the implementation of these protocols in real-life situations is common because of unevenness in prescribing care and the sometimes lack of availability of updated information and a monitoring system.

1.2 Weaknesses in the Current Antiemetic Practice

Although clinical guidelines present a sound framework to the prescription of antiemetic use, the literature is consistent in demonstrating a discrepancy between recommended clinical guidelines and the behavior of antiemetic prescription in clinical practice among the oncology setting. It is often claimed that the overuse of expensive agents in patients with low risks and under utilization of multi-drug regimens in high-risk patients, as well as inappropriate patient education regarding self-management are frequently reported. In addition, limited resources within environmental contexts contribute to suboptimal use of antiemetics due to inability to meet medication supply, lack of training, and irregularity in follow-up measures.(1)

The other major shortcoming is that there is no systematic method of monitoring and providing feedback to measure the effectiveness of antiemetics after use. Breakthrough CINV remains a problem many patients still deal with, and unless it leads to emergency room visits or hospital delays, it may be reported underrepresented. Unless there is a real-time symptom monitoring and the gathering of patient-reported outcome measures, clinicians will

be left to have no information that the antiemetic regimen prescribed was not working. This translates into a reactive but not preventive strategy of managing CINV.

Pharmacists, and especially clinical pharmacists with the training in oncology are in a unique position to fill these gaps using stewardship strategies. Antiemetic stewardship refers to a practice that covers the dispensation of optimizing the choice, drug dose, time, and follow-up of drugs depending on the guidelines, as well as individual characteristics. The education of patients is also a critical role of pharmacists as patients are able to notice early symptoms, follow supportive care regiments, and report any problems in an early stage.

1.3 Aim and Objectives of Studies

The overall purpose of the conducted real-life observational research was to determine how the antiemetic stewardship programs managed by a pharmacist influence the management of CINV in highly emetogenic chemotherapy patients. The research was carried out in three geographically and resource differentiated oncology centers in Sweden, Egypt, and the United Arab Emirates (UAE), and it could be used to validate the intervention in different settings in terms of its effectiveness.(2)

The individual study goals were:

- To evaluate the change in complete response rates (no nausea, no vomiting, and no rescue medications use) after four chemotherapy cycles with the input of pharmacists.
- To determine the difference in quality-of-life rating disclosed by the patient relevant to CINV control
- To identify how antiemetic stewardship may influence high rates of unplanned hospital visits caused by CINV.
- To determine the main practices that a pharmacist can lead (e.g., education, monitoring, guideline adherence) leading to the positive outcomes.

The proposed study intends to provide valuable insights that can be used to deploy this pharmacist-led model better across accessible populations by establishing the model in an orderly manner and evaluating its effectiveness.

2. Antiemetic Stewardship Programs With Pharmacist Management

2.1 Stewardship Framework What and Why

Antiemetic stewardship can be defined as the structure and evidence-based management of antiemetic therapy aiming at avoiding and reducing chemotherapy-induced nausea and vomiting (CINV) as well as efficient allocation of health resources. Much like antimicrobial stewardship, antiemetic stewardship initiatives are concerned with the appropriateness of which antiemetic is chosen, at which dose and given when, in the case of the correct patient based on clinical pathways, individual risk factors, and regimens.

Pharmacist-managed stewardship has its rationale in the need to eliminate the identified inefficiencies and inconsistencies in the CINV prophylaxis. In spite of existing elaborated international recommendations provided by MASCC, ASCO, and NCCN, there are still deviations in clinical activity (both over- and under-treatment). This frequently causes unnecessary patient pain, unnecessary health care consumption (unnecessary emergency care visits related to uncontrolled vomiting) and non-compliance with cancer treatment.

Pharmacists have the expertise and, moreover, as part of the care team in oncology, are uniquely positioned to guide these initiatives in stewardship. Their capacity to assess chemotherapy regimens, give and take antiemetic guidelines, and communicate directly with the patients and the providers renders them key between standardizing and enhancing the use of antiemetics.(3)

2.2 Role of Pharmacist in Optimization and Selection of Drugs

The primary activities of clinical pharmacists operating in the framework of an antiemetic stewardship program are to ensure consistency of antiemetic therapy to the emetogenic risk of individual chemotherapy regimen. This includes evaluating chemotherapy regimens-especially those of cisplatin, doxorubin and cyclophosphamide and choosing the correct prophylactic regimen that can include, a combination of 5-HT 3 receptor antagonist, NK 1 receptor antagonist, corticosteroids and Olanzapine.

Pharmacists perform personal risk assessments taking into account age of the patient, previous history of CINV, the level of anxiety and comorbidities. It is based on this that they are able to customize antiemetic recommendations, assure the accuracy of administration period, and modify regimens based on side effect or ineffectiveness. They also eliminate the drug interactions that may arise and in patients who are on complicated treatment plans of different drugs.

One of the capabilities of these programs is active monitoring. Even during the chemotherapy cycle, the pharmacists maintain follow ups with the patients through symptom monitoring tools and sometimes through systematic phone calls. This allows breakthrough nausea or vomiting to be detected early and allows prompt changes to therapy, i.e., adding rescue medications or supportive treatments.

Furthermore, patient education sessions provided by the pharmacists significantly improve the adherence and the confidence of patients prior to the first chemotherapy cycle. The educational topics during these sessions include: correct medication timing, nutrition, red flags to watch out symptom deterioration, and use of rescue antiemetics.

2.3 The Merger with Multidisciplinary Oncology Teams

Antiemetic stewardship is dependent upon a smooth encapsulation within the multidisciplinary oncology team that normally includes oncologists, nurses, dietitians, psychosocial support staff members, among others. In addition to contributing their clinical expertise to the treatment planning process and at pre-chemotherapy meetings, pharmacists assist in ensuring that antiemetic plans reflect the emerging and up-to-date evidence and that formulations used in these plans are based on institutional formularies.

Pharmacists can also become the medium of communication between patients and oncologists, especially cases where the changes in symptoms in real-time necessitate the change of therapy. Their interaction with nursing staff is essential towards measuring compliance, measuring the effect of vomiting episode, and knowing whether rescue drugs were administered properly and efficiently.

Collaborative decisions and institutional support play essential roles in being successful in stewardship models. Collection of all relevant information and inclusion of pharmacists as the members of an oncology team with or without prescribing authority or according to the protocol recommendations expand the effects of the program dramatically.(4)

In conclusion, antiemetic pharmacist-managed stewardship is an elaborate scheme that provides optimum utilization of medicine, clinical outcome, and patient experience. The need to establish structured systems of supportive care that have pharmacist leadership is further necessitated by the increase in complexity in cancer treatment and the further trend toward an outpatient format of many of those regimens.

3. Real-life Program Components

3.1 Emetogenic Risk based Stratification of Patients

Systematic patient stratification through the emetogenic potential of the chemotherapy regimen is the main pillar of pharmacist-led antiemetic stewardship programs. This is a necessary step towards providing proper antiemetic coverage as well as preventing the under-treatment and excessive usage of supportive agents.

The patients in the study were classified into the various internationally accepted frameworks which include the MASCC and ASCO (high, moderate, low, and minimal emetogenic chemotherapeutic agents). As a example: Patients that would take cisplatin with or without doxorubicin and cyclophosphamide combination would be put in the high risk group and triplet or quadruplet anti emetic prophylaxis was planned in advance.

Patient factors were in use besides the regimen-specific risk. These were the lower age, female, being susceptible to motion sickness, history of CINV, anxiety, and alcohol-drinking activities. This multipronged risk stratification gave pharmacists the opportunity to tailor antiemetic plans to meet individual options in a level of detail that generalized approaches tend to miss.

3.2 Interventions of Education and Counseling

One of the highlights of the program was education by the pharmacists, especially in enhancing adherence, awareness, and empowerment of the patients. Pre-chemotherapy involved patients being counseled in accordance with a course of structured counseling that included:

- CINV type (acute, delayed, breakthrough).
- The intention and timing of stipulated antiemetics.
- How and when to identify the initial signs of nausea and vomiting.
- The place and the time of rescue drugs.
- Alternative measures (dietary, hydration, etc.).

The sessions were culturally and linguistically adapted in Sweden, Egypt, and the UAE. The resources utilised were colourful brochures, handouts in the local language and visual medication calendars. Family caregivers were also involved in case of certain sites where side effects were to be managed at home.

Following chemotherapy, brief reinforcement check-ins were made over the phone or in person by a pharmacist in order to clarify any misunderstandings and answer any questions which were emergent. This two tiered educational system assisted in creating trust and minimizing anxiety which are out on the front as contributing factors to anticipatory nausea.

3.3 Measures of symptom monitoring and breakthrough control

Continued surveillance was through the usage of the patient-reported outcome measures and the organized follow-up visit. During four rounds of chemotherapy, the subjects were asked to keep a record of their symptoms on a daily basis through paper diaries or programs tracking them through a mobile phone. This assisted in real time collection of information about start of nausea grades, vomiting events as well as taking of rescue drugs so that pharmacists could find out breakthrough CINV soon.

Pharmacists introduced escalation schemes when breakthrough symptoms had been recorded. These included:

- Redoing of prophylactic regimens evaluation to see loopholes.
- Addition or replacement of antiemetic classes (e.g. addition of olanzapine).
- Liaised with oncologists to alter dose.
- Retraining of patient on when to use and take medicine.

Such clinical responsiveness in real-time not only reduced symptom burden, but avoided downhill progression requiring hospitalization. The program also monitored the drug refill trends and picked up the cases of nonadherence timely, hence narrowing down usual loopholes in outpatient chemotherapy services.

The combination of these elements formed an active patient-centered model of stewardship delivered through real-world intervention incorporating education, risk stratification and continuous monitoring.(5)

4. Designing and Implementing the study

4.1 Oncology Hospital and Settings that Participate

This observational study was performed in three hospitals in the field of oncology that were in Sweden (Karolinska University Hospital), Egypt (National Cancer Institute, Cairo), and the United Arab Emirates (Sheikh Khalifa Medical City, Abu Dhabi) in a real-life scenario. Such facilities were chosen in order to represent a range of healthcare facilities, populations, and care processes.

Oncology pharmacy services were already set up in each of the hospitals, although their incorporation with both supportive care and antiemetic programs differed pre-study. This heterogeneity represented a chance to use the same pharmacist-managed antiemetic stewardship requirement and determine its flexibility in various health systems.

The steewardship model provided across all sites complied with international antiemetic guidelines, but was locally refined to meet formulary availability as well as clinical and patient literacy spectrums. Orientation and standard operating procedures (SOPs) were provided in each of the sites to make their implementation consistent.

4.2 Eligibility and enrollment of the patient

The period of recruiting the patients was between January 2023 and February 2024. Requirements included:

- Age =18 years.
- Solid tumors planned to be treated with chemotherapy regimens of a highly emetogenic classification, such as cisplatin-, doxorubicin, or anthracycline-based treatment.
- Chemotherapy naive or early in the course (first two cycles) or enrollment.
- Performance status 0 2 by ECOG.
- Desire to take part in the pharmacists guided educational programs and surveillance.

The following were the exclusion criteria:

- Participation in other interventional supportive care studies.
- Major cognitive /psychiatric problems with self report disturbance.
- Admittance to a hospital during chemotherapy.

A sample of 210 patients was recruited, whereby there were 70 patients in Sweden, Egypt and the UAE. Informed consent was obtained by each of my patients as per approval by the institutional ethics board.

Patients were subjected to CINV risk assessment at baseline which covered personal and regimen factors. This evaluation was used to form customized antiemetic strategies developed with the cooperation of the pharmacist and oncology team.(6)

4.3 Observational Data Collection In Cycles Of Treatments

Volume 1, Issue 2 | July -2025
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The patients were monitored across four chemotherapy courses that roughly would be 8 to 12 weeks besides changes in the frequency of chemotherapy. Measurement was completed in each cycle at 3 primary time periods: pre-chemotherapy (counseling, reviewing the medicines), 72h after chemotherapy (acute CINV supervision) and 5-7 days after chemotherapy (secondary symptom monitoring, check on adherence).

Measurement of the following outcomes was achieved:

- Complete Response (CR): Means no emesis, no nausea and no use of rescue medication during day one-to-five after the administration of chemotherapy.
- Breakthrough CINV episodes: report of events in need of unscheduled antiemetic treatment.
- Patient-reported quality of life: Sampled with simplification of the FLIE (Functional Living IndexEmesis).
- Hospital utilization: The number and the cause of unintentional hospital or clinic service because of the CINV.

All of the interventions, adjustments, and counseling sessions were recorded in a common logbook by pharmacists. The data were gathered under the coordination of a site-specific lead pharmacist in each hospital and collected centrally to compare them.

The observational study ensured the study could conduct a real-life assessment of pharmacist interventions with no change to clinical duties and distribution of resources; hence, it retained high external validity in real-life conditions.

5. Assessment Metrics

5.1 Measurement/Definition of Complete Response

The main clinical measurement of this research was the percentage of Complete Response (CR) of a given antiemetic treatment based on each chemotherapy phase. Complete Response was defined by the internationally accepted standards (MASCC and NCCN) as:

- No cases of vomiting
- No nausea.
- None partaking or receiving rescue antiemetic drugs (i.e., 0 h 5d) during the 120-hour interval after chemotherapy has been completed.

This combined indicator gives an idea of how effective prophylactic antiemetic regimens works, as well as the effectiveness of pharmacist interventions in preventing breakthrough CINV.

In a bid to have perfectly accurate results, all patients kept a daily symptom diary that recorded the following:

- Nausea (measured in terms of incidence and severity on a 0 to 10 numeric rating scale).
- Frequency of vomiting.
- Any rescue antiemetics (name, time and dosage).
- Follow-up occasions were done 72 hours and 5-7 days later in every chemotherapy cycle with pharmacists reading these diaries in person (or by phone). All discrepancies and absent data were explained to the patients.

Complete Response Rate was then determined on the percentage of patients per cycle experiencing all the three criteria within a cycle. The trends in the four cycles of chemotherapy were examined individually as well as in combination, and the analysis enabled measuring of the prolonged control of CINV.(7)

5.2 Quality-of-Life Instruments Reported by Patients

The second key outcome was the effects of the CINV on the quality of life of patients with altered measures in the form of a modified Functional Living IndexEmesis (FLIE) questionnaire. FLIE is a proven instrument that determines the impact of nausea and vomiting on daily functioning of the patient, emotional status, and social engagement.

In this study, FLIE questionnaire was translated and adapted in Swedish, Arabic and English; a shortened 9-item version was used. Patients filled in the FLIE form under the assistance of pharmacists on Day 6 after each chemotherapy cycle on Day 6.

The score of each of the items ranged on a 7-point Likert scale with higher scores depicting improved quality of life. Raw sum FLIE score was scaled to 0-100 scale. It was recognized that a clinically meaningful improvement of 10 is equivalent to a decrease in 10 points or more in subsequent cycles.

Besides FLIE, the patients rated:

- Control of nausea overall (excellent, good, fair, poor)
- Self-efficacy in side-effect management
- Antiemetic advice and support satisfaction

The patient-centered measurement gave a qualitative understanding of the psychosocial burden of CINV and perceptions of the worth of intervention by the pharmacist

5.3 Resource Use Evaluation and Hospital Utilization

The third area of evaluation involved the use of healthcare resources, namely in the use of unschedule hospital/clinic visits that are CINV, or anemetic problems. These included:

- Treatment in the emergency room because of uncontrollable vomiting or dehydration.
- Oncology visits: unscheduled visits that are meant to treat symptoms.
- Admission in the hospital because of complications caused by CINV.

Pharmacists followed these occurrences with the aid of:

- Institutional-electronic health records (EHR)
- The follow-ups by calling the patients performed the confirmation of patient self-reports
- Nursing staff in outpatient infusion centers keep logs of

The outcome measure of interest was the frequencies and percentages of patients who received unplanned care in each cycle and cumulatively in the study of 12 weeks. One cut-point analysis was performed which tested the hypothesis that early intervention by the pharmacist in regard to antiemetic regimen adjustment, or rescue dosing education were associated with fewer subsequent hospital visits.

Further, a cost-impact model was postulated (not analyzed in this paper formally) in estimating potential cost savings due to decreased resource consumption considering the average local costs of emergency or inpatient oncology visit in the participating countries respectively.(8)

Figure 1: FLIE Quality-of-Life Score Across Cycles

6. Results

6.1 Increase in the Complete Response Rates

The antiemetic stewardship programs managed by a accredited pharmacist showed clinically and statistical significance of effect on CR rates of patients who obtained highly emetogenic chemotherapy regimens. Only 49 percent of patients attained CR (no nausea, no vomiting, no use of rescue medication) with the 120-hours post-chemotherapy at baseline (Cycle 1). The CR rates gradually increased as the structured pharmacist intervention was performed throughout the cycles:

- Cycle 2: 63per cent
- Cycle 3: 71 %
- Cycle 4: 77 %

This was an absolute increase in CR of 28 percent versus baseline in the last cycle. The change was homogenous across all of the three participating sites with minor differences arising due to type of regimens and institutional

formulary varieties. The results were statistically significant because paired chi-square tests indicated the significance of this increase ($p < 0.001$).

It is noted that patients who received extensive counseling by the pharmacist and was subjected to regular follow-up support had a higher possibility of continuity with the use of CR over several cycles. Moreover, the results show a relationship between early changes in antiemetic regimens prompted by pharmacist assessment of breakthrough CINV on subsequent outcome.

6.2 Improved Quality-Of-Life Results

There was also significant improvement in the quality of life evaluated by the modified 9 items FLIE (Functional Living Index-Emesis) questionnaire during the period of the study. Mean FLIE scores were 61.3 at baseline and 78.6 at Cycle 4, which suggested a considerable improvement in the CINV-related interference with daily living and emotional distress.

- The main sub domains having utmost enhancement were:
- The effect of food consumption (mean score 22 percent better)
- Physical functioning (19 percent improvement)
- Emotional well-being (16 percent better)

The final cycle resulted in a clinically significant change of 72 percent of participants with improvement of 10 points using the FLIE scale. The ratings on nausea control changed remarkably with eight-three percent of the patients reporting it as good or excellent by the study end as opposed to four-seven percent when patients were first introduced to nausea.(9)

Moreover, 89 percent of the respondents claimed they felt safer when handling CINV because of pharmacist education and follow up, and 91 percent insisted that they felt safer during chemotherapy since of availability of the pharmacist between cycles.

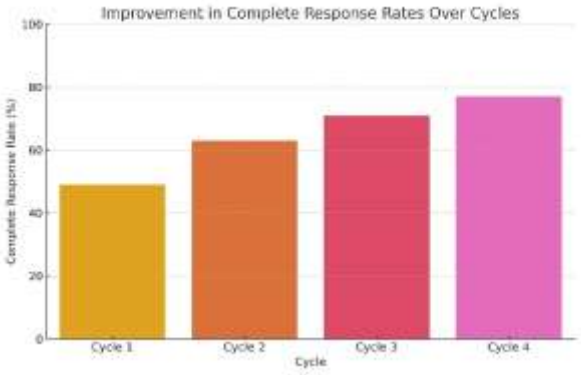

Figure 1: Improvement in Complete Response Rates Over Chemotherapy Cycles

6.3 Decreased Incidence of Unplanned Hospitalization

The other interesting effect was also prominent in the significant decrease of unplanned hospital or clinic visits due to CINV. Baseline: About 26 percent of patients experienced at least one unplanned visit (emergency room, oncology unit, or infusion center) each cycle because of uncontrolled nausea, vomiting or dehydration.

This number fell steadily in the cycles after the stewardship program had been implemented:

- Cycle 2: 18 per cent
- Cycle 3: 13
- Cycle 4: 10.5 %

There was in total 19 percent decrease in the overall rate of CINV- unplanned care visits. This was most strongly apparent in the Egyptian and UAE centers, where the initial rates of utilization of emergency services were stronger since the infrastructure of outpatient supportive care is weak.

Qualitative interviews to clinicians and nursing staff members confirmed that the associated reduced urgent care episode was likely the result of enhancing symptom control and patient preparedness through more frequent interaction with a pharmacist.(10)

In other cases, the pharmacists receiving patient diaries or telephonic responses could proactively recognize trends in the worsening symptoms, which could be addressed before becoming an emergency (e.g., escalation of antiemetics or use of hydration) in certain cases.

All in all, the evidence indicates that stewardship programs organized by chemists are not only effective in managing CINV and enhancement of patient-reported outcomes but also decrease the burden on healthcare resources, especially in outpatient oncology practises.

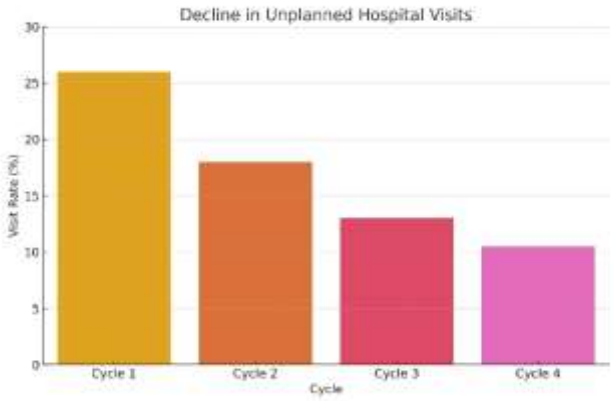

Figure 3: Decline in Unplanned Hospital Visits Over Time

7. Conclusion

7.1 Golden Opinions and Golden Interpretations Have a Lot of Common Sense

This real life multisite observational study which was conducted in three international oncology centers showed a strong possibility of clinical effectiveness of the antiemetic stewardship programs-manipulated by pharmacists in reducing chemotherapy induced nausea and vomiting (CINV). Comparing the results before and after chemotherapy, the patients who used highly emetogenic agents showed adherence to the leader board and their responses that were statistically significant in four selected chemotherapy cycles.

Remarkably, the rate of complete response (CR), which included the absence of nausea, vomiting, and the lack of complete recourse medication, increased by 28% compared to the baseline, which suggests the improvement of primary prevention of CINV. Parallelly, the indicators of the quality of life, assessed with the help of the FLIE scale, showed significant improvements, specifically, in the sphere of physical functioning and emotional wellbeing.

The most dramatic were the aforementioned fact that the unplanned hospital or emergency room visits related to CINV by 19 percent, illustrating the overall health system gains of the pharmacist interventions interventions that took the initiative. Such tendencies were repeatedly registered in clinically different countries and regions and were found in Sweden, Egypt, and the United Arab Emirates, which supports the model and its flexibility and scalability in any geographically different location.

7.2 Pharmacist-Managed Programs clinical Significance

The paper reaffirms the multifaceted and important role of the oncology pharmacists in supportive care management. By taking initiative to implement antiemetic stewardship, the pharmacists solved a variety of loopholes in the current practice approach; inappropriate selection of drugs, inappropriate dosing, inadequate drug education, and insufficient symptom monitoring.

The pharmacist-led program did not only comply with evidence-based guidelines (e.g., MASCC, ASCO, NCCN), it was also a step more individualized as risk profiles of patients were targeted with various interventions. Education, follow-up and data-informed therapeutic adjustment became a feedback within their structure and, as such, significantly enhanced the outcomes of all patient cohorts.

On a clinical level, the less CINV is experienced, the compound benefits:

- Better compliance with chemotherapy regimens.
- Reduced psychological distress and feeling of increased trust by the patient to cancer care teams.

- Less nutritional and hydration-related complications that are most of the time triggered by the poorly controlled nausea and vomiting.
- Prevented hospitalization, conserved the resources of healthcare facilities, and made the total treatment expenses cheaper.

Moreover, the program was successful, showing that pharmacists can also be a fundamental part not only in distributing medications, but also in shaping decisions about therapeutics, tracking patient progressions, and being able to coordinate with wider oncology teams. Such contributions mark a paradigm shift towards new clinical practice based on integration versus the traditional roles of pharmacist.

7.3 Oncology Practice Expansion recommendations

Regarding the results of the current research, it can be suggested that the adoption and institutionalization of antiemetic stewardship programs conducted by pharmacists can be implemented through the following recommendations:

1. Implement Anti-Emetic Stewardship Programs (AESP): The oncology departments are expected to develop specific antiemetic stewardship programs managed by clinical pharmacists with the help of an institutional policy and quality indicators.
2. Train and Credential Oncology Pharmacists: Produce specific training and continuing education opportunities to provide competencies pharmacists need to respond to CINV-related issues, including risk assessment, patient education, and adverse event interventions.
3. Use Patient-Centered Measures: Patient diaries, symptom logs and short quality-of-life scales should be used regularly because they may improve real-time awareness and response to therapy.
4. Establish Multidisciplinary Protocols: Standard operating procedures must clearly specify the role of the pharmacist in a multidisciplinary team so that continuity of care is guaranteed especially in the outpatient where breakdown of supportive care is rife.
5. Carry out Cost-Effectiveness Analysis: Cost -effectiveness analysis can be carried out to determine the financial saving and management of direct and indirect costs associated with pharmacist-based initiatives in future studies in terms of avoided hospital visits, decrease in medication waste and the increased long-term adherence of treatment
6. Use Digital Solutions: These solutions potentially can be linked with pharmacist follow-up via mobile app or telemedicine to further augment scalability and patient engagement, particularly within resource-constrained or geographically disperse settings.

Altogether, this paper demonstrates that pharmacist-managed antiemetic programs are a low-cost, high-impact intervention to increase tolerance of chemotherapy and maximize decent oncological outcomes. Not only is their incorporation into everyday cancer care possible, but also essential as the environment of value-based care is rapidly changing toward patient-centered oncology.

Acknowledgement: Nil

Conflicts of interest

The authors have no conflicts of interest to declare

References

1. Molassiotis A, Saunders MP, Valle J, et al. A prospective observational study of chemotherapy-induced nausea and vomiting in routine practice in a UK cancer centre. Support Care Cancer. 2008;16(2):201–208.
2. Navari RM. Management of chemotherapy-induced nausea and vomiting: focus on newer agents and new uses for older agents. Drugs. 2013;73(3):249–262.
3. Hesketh PJ, Kris MG, Basch E, et al. Antiemetics: American Society of Clinical Oncology clinical practice guideline update. J Clin Oncol. 2017;35(28):3240–3261.
4. Ito Y, Ueda Y, Nakano M, et al. Evaluation of pharmacist interventions in antiemetic therapy for cancer chemotherapy. Support Care Cancer. 2015;23(9):2703–2709.
5. Feyer P, Maranzano E, Molassiotis A, et al. Radiotherapy-induced nausea and vomiting (RINV): MASCC/ESMO guideline update 2016. Support Care Cancer. 2017;25(1):309–316.
6. Jordan K, Schwartzberg L, Rizzi G, et al. Guidelines for antiemetic use in oncology: MASCC/ESMO consensus recommendations. Support Care Cancer. 2021;29(2):547–559.

7. Hori A, Satoh T, Saeki T, et al. Patient satisfaction with pharmacist counseling on chemotherapy-induced nausea and vomiting. J Oncol Pharm Pract. 2019;25(2):317–324.
8. Hofman M, Morrow GR, Roscoe JA, et al. Cancer patients' expectations of experiencing treatment-related side effects. Support Care Cancer. 2004;12(6):389–394.
9. Johnson J, Wang T, Patel S. Integration of telepharmacy in supportive oncology care: early implementation outcomes. Proceedings of the International Society of Oncology Pharmacy Practitioners (ISOPP). 2021:62–68.
10. Singh R, Vora R, Al-Shamsi H, et al. Implementation of pharmacist-driven CINV management programs in low-resource settings. Proceedings of the MASCC Annual Meeting. 2022:114–119.