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Risk-Stratified Antiemetic Prophylaxis and Postoperative Nausea and Vomiting Following Elective Surgery: A Retrospective Secondary Analysis

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ABSTRACT

Background: Postoperative nausea and vomiting (PONV) remains one of the most frequently encountered complications following anesthesia and surgery and continues to have an important influence on postoperative comfort and recovery. Although PONV is generally transient, clinically significant symptoms may delay oral intake and mobilization, increase the requirement for rescue medication and nursing observation, and adversely affect patient satisfaction. The occurrence of PONV is multifactorial and is influenced by patient-related characteristics, anesthetic exposure, surgical factors, and postoperative analgesia. The simplified Apfel risk score provides a practical approach to identifying patients at increased risk [1,2]. Contemporary recommendations emphasize risk assessment together with multimodal preventive strategies rather than treatment after symptoms have already developed [1,3].

Objective: The present study was undertaken to evaluate the association between the intensity of prophylactic antiemetic therapy and the occurrence of PONV during the first 24 postoperative hours among adults undergoing elective surgery. A secondary objective was to evaluate the relationship between accumulation of established PONV risk factors and postoperative symptoms and to identify independent factors associated with PONV.

Methods: This retrospective secondary analysis included 220 adult patients who underwent elective surgery under general anesthesia or a general-anesthesia-containing technique during an 12-month period from January 2024 to December 2024. Demographic characteristics, established PONV risk factors, anesthetic exposures, postoperative opioid administration, prophylactic antiemetic therapy, PONV occurrence and timing, and rescue antiemetic requirements were evaluated. Patients were categorized according to prophylactic antiemetic intensity as receiving no prophylaxis, single-agent prophylaxis, or multimodal prophylaxis. PONV incidence was compared across prophylaxis groups and according to the number of established risk factors. Multivariable logistic regression was used to identify factors independently associated with PONV.

Results: PONV occurred in 63 of 220 patients (28.6%) during the first 24 postoperative hours. PONV occurred in 26 of 65 patients (40.0%) who received no prophylaxis, 28 of 91 patients (30.8%) who received single-agent prophylaxis, and 9 of 64 patients (14.1%) who received multimodal prophylaxis (P=0.004). The frequency of PONV increased progressively with accumulation of established risk factors, from 8.7% in patients with no risk factors to 60.0% among those with all four evaluated risk factors (P<0.001). Previous PONV or motion sickness was the strongest independent predictor of PONV (adjusted odds ratio [aOR], 3.42; 95% confidence interval [CI], 1.55–7.55; P=0.002), followed by female sex (aOR, 2.53; 95% CI, 1.27–5.03; P=0.008), postoperative opioid administration (aOR, 2.31; 95% CI, 1.16–4.58; P=0.017), and anesthesia duration >120 minutes (aOR, 1.96; 95% CI, 1.00–3.84; P=0.049). Multimodal prophylaxis was independently associated with lower odds of PONV compared with no prophylaxis (aOR, 0.31; 95% CI, 0.12–0.78; P=0.013).

Conclusion: PONV affected more than one-quarter of patients in this elective surgical population and demonstrated a progressive increase with accumulation of

established risk factors. Multimodal prophylactic antiemetic therapy was associated with lower occurrence of PONV compared with no prophylaxis. These findings support systematic perioperative risk assessment, reduction of modifiable emetogenic exposures, and appropriately intensified prophylaxis in patients at increased risk. However, because this was an observational analysis, the findings should be interpreted as associations rather than evidence of a causal treatment effect.

Keywords*: Postoperative nausea and vomiting; PONV; antiemetic prophylaxis; multimodal prophylaxis; Apfel risk score; postoperative opioids; elective surgery; anesthesia; postoperative recovery.*

INTRODUCTION

Postoperative nausea and vomiting (PONV) is one of the most common complications encountered following anesthesia and surgery. Although symptoms are frequently transient, PONV may have a substantial effect on postoperative recovery by delaying oral intake and mobilization, increasing the need for rescue antiemetic medication and nursing observation, and contributing to patient dissatisfaction. Persistent vomiting may additionally result in dehydration, electrolyte disturbances, aspiration, pain, bleeding, and wound-related complications [1,3].

The development of PONV is determined by multiple interacting patient-, anesthetic-, and surgical-related factors rather than by a single cause. Female sex, non-smoking status, previous PONV or motion sickness, and postoperative opioid requirement are among the most consistently recognized predictors and form the basis of the simplified Apfel risk score [2]. Other perioperative factors, including duration of anesthesia, volatile anesthetic exposure, and type of surgery, may further influence the overall risk [4,5].

Risk assessment has consequently become an important component of perioperative PONV prevention. The simplified Apfel model provides a practical method of estimating risk by counting four established predictors. The original validation study demonstrated a progressive increase in the probability of PONV as the number of risk factors increased, supporting the clinical relevance of cumulative risk assessment [2].

However, identification of patients at increased risk does not itself prevent PONV. Contemporary consensus recommendations emphasize a combination of strategies, including reduction of baseline emetogenic risk, appropriate pharmacological prophylaxis, and multimodal preventive approaches in patients with clinically important risk [1]. Combining antiemetic agents with different mechanisms of action may provide broader protection than relying on a single agent, and evidence from systematic reviews and meta-analyses supports combination prophylaxis in appropriate clinical settings [6-8].

The practical value of risk-adapted prophylaxis is particularly relevant in routine perioperative care. A uniform prophylactic approach may result in inadequate protection for patients with several simultaneous risk factors, whereas appropriately intensified prophylaxis may provide more effective prevention in high-risk individuals. At the same time, treatment decisions in routine clinical practice are influenced by patient characteristics, surgical procedures, anesthetic techniques, and clinician preference.

The dataset used for the present analysis contains information regarding prophylactic antiemetic use, PONV occurrence, postoperative opioid exposure, established risk factors, and rescue treatment. In the original cohort, 155 patients received at least one prophylactic antiemetic, while 65 patients received no prophylaxis.

Therefore, the present secondary analysis was undertaken to examine the association between the intensity of antiemetic prophylaxis and PONV among adults undergoing elective surgery. The study also assessed the relationship between cumulative PONV risk factors and postoperative symptoms and evaluated clinical and perioperative factors independently associated with PONV.

MATERIALS AND METHODS

Study Design and Setting

This was a retrospective observational secondary analysis of an institutional perioperative dataset. The original dataset comprised adult patients undergoing elective surgical procedures at a tertiary care hospital.

Medical records of patients operated during an 12-month period from January 2024 to December 2024 were reviewed. The present analysis used predefined clinical and perioperative variables recorded in the institutional database.

The analysis was conducted in accordance with applicable principles for retrospective clinical research.

Study Population

The study population consisted of 220 adult patients who underwent elective surgery under general anesthesia or a combined anesthetic technique involving general anesthesia.

Inclusion Criteria

Patients were eligible for inclusion if they:

1. were aged ≥18 years;
2. underwent elective surgery during the study period;
3. received general anesthesia or a combined anesthetic technique involving general anesthesia;
4. had adequate anesthesia and postoperative documentation; and
5. had sufficient information regarding PONV and major perioperative risk factors.

Exclusion Criteria
Patients were excluded if they:
1. underwent emergency surgery;
2. had nausea or vomiting before surgery;
3. had active gastrointestinal conditions associated with vomiting;
4. underwent procedures exclusively under local anesthesia without sedation; or
5. had inadequate perioperative or postoperative documentation.

Data Collection
Data were obtained from pre-anesthetic assessment records, anesthesia charts, operating-room documentation, postoperative recovery records, nursing documentation, and clinical notes.

The following variables were evaluated:
1. demographic characteristics;
2. previous PONV or motion sickness;
3. smoking status;
4. ASA physical status;
5. relevant comorbidities;
6. surgical specialty and procedure characteristics;
7. duration of surgery;
8. duration of anesthesia;
9. volatile anesthetic and nitrous oxide exposure;
10. intraoperative opioid exposure;
11. postoperative opioid administration;
12. prophylactic antiemetic therapy;
13. occurrence and timing of PONV; and
14. requirement for rescue antiemetic therapy.

The original database used a structured data collection proforma, and patient identifiers were excluded from the analytical database.

Definition of PONV
The primary outcome was the occurrence of nausea and/or vomiting within the first 24 postoperative hours.

PONV was considered present when postoperative documentation recorded nausea, retching, vomiting, or administration of rescue antiemetic treatment in the context of clinically documented nausea or vomiting.

Where timing was documented, PONV events were categorized as occurring during:

- 0–2 hours;
- 2–6 hours; or
- 6–24 hours.

Classification of Antiemetic Prophylaxis
Patients were classified into three groups according to the intensity of prophylactic antiemetic therapy documented in the anesthesia record.

No prophylaxis: No prophylactic antiemetic agent was administered.

Single-agent prophylaxis: One prophylactic antiemetic class was administered.

Multimodal prophylaxis: Two or more prophylactic antiemetic classes were administered.

Rescue antiemetic treatment administered after the development of PONV was considered separately from prophylactic therapy.

Assessment of Baseline PONV Risk
The major established PONV risk factors considered in the analysis were:
- female sex;
- non-smoking status;
- previous PONV or motion sickness; and
- postoperative opioid use.

Patients were categorized according to the number of these risk factors present, corresponding to the principles of the simplified Apfel risk score [2].

Outcome Measures
Primary Outcome
The primary outcome was the occurrence of PONV during the first 24 postoperative hours.

Secondary Outcomes
Secondary outcomes included:
1. PONV incidence according to prophylaxis intensity;
2. PONV incidence according to accumulated risk factors;
3. timing and clinical manifestation of PONV;
4. requirement for rescue antiemetic therapy; and
5. independent predictors of PONV after adjustment for relevant covariates.

Statistical Analysis
Continuous variables were expressed as mean ± standard deviation or median with interquartile range, as appropriate. Categorical variables were presented as frequencies and percentages.

Categorical variables were compared using the chi-square test or Fisher's exact test, while continuous variables were compared using the independent-samples t test or Mann–Whitney U test according to distribution.

Variables considered clinically relevant or demonstrating an association at $P<0.10$ during univariable analysis were considered for multivariable logistic regression. Adjusted odds ratios with 95% confidence intervals were reported.

All statistical tests were two-sided, and $P<0.05$ was considered statistically significant.

RESULTS
Baseline Characteristics
A total of 220 patients were included in the final analysis. The mean age of the study population was 46.8 ± 14.7 years, and 118 patients (53.6%) were female. The mean BMI was 25.9 ± 4.1 kg/m².

Most participants were classified as ASA physical status I or II, with 91 (41.4%) classified as ASA I, 104 (47.3%) as ASA II, and 25 (11.4%) as ASA III.

Non-smokers accounted for 166 patients (75.5%), while 37 (16.8%) had a previous history of PONV and/or motion sickness. Hypertension and diabetes mellitus were present in 53 (24.1%) and 41 (18.6%) patients, respectively.

Laparoscopic procedures were performed in 53 patients (24.1%). Volatile anesthetics were used in 163 patients (74.1%), nitrous oxide in 54 (24.5%), and postoperative systemic opioids were administered to 113 patients (51.4%).

Table 1. Baseline Characteristics of the Study Population

Variable	Overall population (n=220)
Age, years, mean ± SD	46.8 ± 14.7
BMI, kg/m², mean ± SD	25.9 ± 4.1
Female sex	118 (53.6%)
Male sex	102 (46.4%)
ASA I	91 (41.4%)
ASA II	104 (47.3%)
ASA III	25 (11.4%)
Non-smoker	166 (75.5%)
Previous PONV/motion sickness	37 (16.8%)
Hypertension	53 (24.1%)
Diabetes mellitus	41 (18.6%)
Laparoscopic procedure	53 (24.1%)
Volatile anesthetic use	163 (74.1%)
Nitrous oxide use	54 (24.5%)
Postoperative opioid use	113 (51.4%)

Overall Occurrence of PONV
PONV occurred in 63 of 220 patients (28.6%), while 157 patients (71.4%) had no documented PONV during the first 24 postoperative hours.

Among patients who developed PONV, isolated nausea was the most frequent manifestation, occurring in 34 patients (54.0%). Vomiting with or without associated nausea was documented in 24 patients (38.1%), while retching without vomiting occurred in 5 patients (7.9%).

The largest proportion of PONV events occurred during the first two postoperative hours. Twenty-five events (39.7%) occurred during 0–2 hours, 20 (31.7%) during >2–6 hours, and 18 (28.6%) during >6–24 hours.

Rescue antiemetic therapy was required by 44 of the 63 patients who developed PONV (69.8%).

Table 2. Clinical Characteristics of PONV Episodes

Characteristic	n (%)
Total study population	220
No PONV	157 (71.4%)
Any PONV within 24 h	63 (28.6%)
Nausea without vomiting	34 (54.0%)
Vomiting with/without nausea	24 (38.1%)
Retching without vomiting	5 (7.9%)
PONV at 0–2 h	25 (39.7%)
PONV at >2–6 h	20 (31.7%)
PONV at >6–24 h	18 (28.6%)
Rescue antiemetic required	44 (69.8%)

Relationship Between Antiemetic Prophylaxis and PONV

A clinically important gradient was observed across prophylactic antiemetic strategies.

Among patients receiving no prophylactic antiemetic, PONV occurred in 26 of 65 patients (40.0%). The incidence decreased to 30.8% among those receiving single-agent prophylaxis and to 14.1% among patients receiving multimodal prophylaxis.

The difference in PONV occurrence across the three prophylaxis categories was statistically significant (P=0.004).

Table 3. PONV According to Intensity of Prophylactic Antiemetic Therapy

Prophylaxis strategy	Total, n	PONV, n (%)	No PONV, n (%)
No prophylaxis	65	26 (40.0%)	39 (60.0%)
Single-agent prophylaxis	91	28 (30.8%)	63 (69.2%)
Multimodal prophylaxis	64	9 (14.1%)	55 (85.9%)
Total	220	63 (28.6%)	157 (71.4%)

PONV According to Accumulated Risk Factors

The occurrence of PONV increased progressively as the number of established risk factors increased.

PONV occurred in 2 of 23 patients (8.7%) with no major risk factors, compared with 11 of 67 patients (16.4%) with one risk factor, 25 of 78 patients (32.1%) with two risk factors, 19 of 42 patients (45.2%) with three risk factors, and 6 of 10 patients (60.0%) with all four risk factors.

The overall trend was statistically significant (P<0.001).

Table 4. PONV According to Number of Established Risk Factors

Number of risk factors	Total patients	PONV, n	PONV incidence
0	23	2	8.7%
1	67	11	16.4%
2	78	25	32.1%
3	42	19	45.2%
4	10	6	60.0%
Total	220	63	28.6%

Factors Associated With PONV

Patients who developed PONV were more frequently female than patients without PONV (71.4% vs. 46.5%; P=0.001).

Previous PONV or motion sickness was also significantly more common among patients who developed PONV than among those who did not (31.7% vs. 10.8%; P<0.001).

Non-smoking status, longer surgical duration, longer anesthesia duration, volatile anesthetic exposure, and postoperative opioid administration were associated with PONV during univariable analysis.

Table 5. Selected Factors According to PONV Status

Variable	PONV (n=63)	No PONV (n=157)	P value
Age, years	43.9 ± 13.8	48.0 ± 14.9	0.054
BMI, kg/m²	26.2 ± 4.3	25.8 ± 4.0	0.526
Female sex	45 (71.4%)	73 (46.5%)	0.001
Non-smoker	54 (85.7%)	112 (71.3%)	0.025
Previous PONV/motion sickness	20 (31.7%)	17 (10.8%)	<0.001
Surgery duration, min	132 ± 48	113 ± 44	0.008
Anesthesia duration, min	154 ± 52	132 ± 49	0.005
Anesthesia >120 min	41 (65.1%)	70 (44.6%)	0.007
Volatile anesthetic use	53 (84.1%)	110 (70.1%)	0.040
Postoperative opioid use	43 (68.3%)	70 (44.6%)	0.002
Any prophylactic antiemetic	37 (58.7%)	118 (75.2%)	0.022

Independent Predictors of PONV

Multivariable logistic regression identified previous PONV or motion sickness as the strongest independent predictor of postoperative symptoms (aOR 3.42, 95% CI 1.55–7.55; P=0.002).

Female sex was associated with approximately 2.5-fold higher adjusted odds of PONV (aOR 2.53, 95% CI 1.27–5.03; P=0.008). Postoperative opioid administration was also independently associated with PONV (aOR 2.31, 95% CI 1.16–4.58; P=0.017).

Anesthesia duration >120 minutes demonstrated a statistically significant association with PONV (aOR 1.96, 95% CI 1.00–3.84; P=0.049).

Multimodal prophylaxis was independently associated with substantially lower odds of PONV compared with no prophylaxis (aOR 0.31, 95% CI 0.12–0.78; P=0.013).

Table 6. Multivariable Analysis of Factors Associated With PONV

Variable	Adjusted OR	95% CI	P value
Previous PONV/motion sickness	3.42	1.55–7.55	0.002
Female sex	2.53	1.27–5.03	0.008
Postoperative opioid use	2.31	1.16–4.58	0.017
Non-smoking status	2.19	0.96–4.98	0.062
Anesthesia duration >120 min	1.96	1.00–3.84	0.049
Volatile anesthetic use	1.79	0.80–4.02	0.156
Single-agent prophylaxis vs. none	0.70	0.35–1.39	0.309
Multimodal prophylaxis vs. none	0.31	0.12–0.78	0.013

DISCUSSION

The present retrospective secondary analysis evaluated the relationship between antiemetic prophylaxis intensity, cumulative PONV risk, and postoperative symptoms in adults undergoing elective surgery. In this cohort of 220 patients, PONV occurred in 28.6% during the first 24 postoperative hours. More importantly, PONV demonstrated a clear gradient according to both the number of established risk factors and the intensity of prophylactic treatment.

The observed overall incidence confirms that PONV remains clinically relevant in routine surgical practice despite advances in anesthetic techniques and the availability of effective antiemetic medications. Current consensus recommendations emphasize systematic risk assessment, reduction of baseline risk, and multimodal prophylaxis rather than relying exclusively on treatment after symptoms develop [1,3].

Antiemetic Prophylaxis and PONV

A central finding of the present analysis was the substantial difference in PONV frequency according to prophylaxis intensity. PONV occurred in 40.0% of patients receiving no prophylaxis, compared with 30.8% receiving single-agent prophylaxis and only 14.1% receiving multimodal prophylaxis.

The difference was statistically significant and remained clinically apparent after adjustment for relevant variables. Multimodal prophylaxis was associated with an adjusted odds ratio of 0.31 compared with no prophylaxis.

This association is clinically plausible because PONV has a multifactorial pathophysiology involving several neurotransmitter pathways. Combining antiemetic agents with different mechanisms may therefore provide complementary protection and is consistent with contemporary recommendations supporting combination prophylaxis in patients at increased risk [1,6-8].

Nevertheless, the observed association should not be interpreted as definitive evidence that multimodal prophylaxis alone caused the reduction in PONV. Treatment allocation in this study was based on routine clinical decision-making rather than randomization. Clinicians may have selected prophylaxis intensity according to perceived patient risk, surgical characteristics, anesthetic exposures, or other clinical factors. Consequently, residual confounding and confounding by indication cannot be excluded.

Cumulative PONV Risk
The progressive increase in PONV with accumulation of established risk factors was another important finding.

PONV increased from 8.7% among patients with no established risk factors to 16.4%, 32.1%, 45.2%, and 60.0% among patients with one, two, three, and four risk factors, respectively.

This progressive pattern is consistent with the underlying principle of the simplified Apfel risk score, which uses the accumulation of established predictors to estimate PONV risk [2]. The finding supports the clinical value of structured risk assessment rather than relying solely on subjective estimation.

The number of patients with all four risk factors was relatively small, however, with only 10 patients in this category. Therefore, the 60.0% incidence should be interpreted cautiously because the estimate may be less precise than those obtained from the larger intermediate-risk groups.

Previous PONV or Motion Sickness
Previous PONV or motion sickness was the strongest independent predictor in the regression model. Patients with a history of previous PONV or motion sickness had more than three times the adjusted odds of developing postoperative symptoms.

This finding is consistent with previous evidence identifying prior susceptibility as one of the most important patient-related predictors of PONV [2,4]. A history of PONV or motion sickness should therefore be actively elicited during pre-anesthetic assessment whenever possible.

Female Sex
Female sex was independently associated with PONV, with women demonstrating approximately 2.5-fold higher adjusted odds than men.

This finding is consistent with established PONV risk models and previous epidemiological evidence [2,4]. Although female sex is not a modifiable factor, identifying it as part of the overall risk profile may assist clinicians in deciding whether additional preventive measures are warranted.

Postoperative Opioid Administration
Postoperative opioid administration was independently associated with PONV. Opioids remain an important component of perioperative analgesia but may increase nausea and vomiting through central and gastrointestinal mechanisms [1,3].

The findings therefore support the use of multimodal, opioid-sparing analgesia where clinically appropriate. The objective should not be indiscriminate opioid avoidance, because adequate analgesia remains essential, but rather reduction of unnecessary opioid exposure while maintaining effective postoperative pain control.

It is important to distinguish actual postoperative opioid administration from anticipated opioid requirement used in preoperative PONV prediction models. In the present dataset, postoperative opioid use was analyzed as a perioperative exposure.

Duration of Anesthesia
Anesthesia duration exceeding 120 minutes was independently associated with PONV. Prolonged anesthesia may reflect greater cumulative exposure to potentially emetogenic anesthetic factors and may also act as a marker of more extensive or complex surgery.

Thus, anesthesia duration should not necessarily be interpreted as an isolated causal factor. Rather, it may represent the combined influence of multiple perioperative characteristics.

Non-Smoking Status and Volatile Anesthetic Exposure

Non-smoking status was significantly associated with PONV during univariable analysis but did not reach conventional statistical significance following adjustment. The direction of association remained consistent with the established epidemiological relationship between smoking status and PONV [2,4].

Volatile anesthetic exposure was similarly associated with PONV during univariable analysis but was not independently significant in the multivariable model.

These findings illustrate the importance of evaluating multiple interacting factors rather than interpreting individual variables in isolation.

Rescue Antiemetic Requirement
Nearly 70% of patients who developed PONV required rescue antiemetic treatment. Specifically, 44 of the 63 patients with PONV received rescue treatment.

This finding has practical implications for postoperative care because treatment after symptom development requires additional medication and clinical attention. Effective preventive strategies may therefore reduce both patient discomfort and the need for subsequent rescue intervention.

Timing of PONV
The timing of PONV events provides an additional clinical consideration. Approximately 40% of documented events occurred during the first two postoperative hours, while almost one-third occurred between 6 and 24 hours.

Therefore, absence of PONV during immediate postoperative recovery does not eliminate the possibility of subsequent symptoms. Continued postoperative surveillance is particularly relevant for patients with multiple risk factors.

Clinical Implications
The findings support a structured approach to PONV prevention involving three sequential components.

First, patients should undergo systematic assessment for established PONV risk factors. Second, modifiable emetogenic exposures should be reduced wherever clinically feasible, including unnecessary opioid exposure and potentially avoidable anesthetic risk factors. Third, prophylactic antiemetic therapy should be appropriately intensified according to the patient's overall risk profile [1,3].

The present findings should not, however, be interpreted as establishing a specific prophylactic protocol because the treatment strategies were not randomly assigned.

Strengths of the Study
The present analysis has several strengths. It evaluates a real-world elective surgical population and incorporates patient-related, anesthetic, surgical, prophylactic, and postoperative variables.

The analysis also evaluates both prophylactic and rescue antiemetic therapy and examines the relationship between cumulative risk factors and PONV. Furthermore, multivariable regression was used to identify factors independently associated with postoperative symptoms rather than relying exclusively on unadjusted comparisons.

LIMITATIONS
Several limitations should be acknowledged.
First, the retrospective nature of the study makes the analysis dependent on the accuracy and completeness of clinical documentation. Mild nausea may have been under-recorded, potentially resulting in underestimation of PONV incidence.

Second, the study was conducted at a single tertiary care center and included a relatively modest sample size, which may limit generalizability to other institutions and surgical populations.

Third, prophylactic antiemetic treatment was not randomly assigned. Clinical decision-making may have influenced which patients received no prophylaxis, single-agent prophylaxis, or multimodal prophylaxis. Therefore, confounding by indication and residual confounding remain possible.

Fourth, detailed dose-level comparisons of individual antiemetic agents were not the primary focus of the available dataset. Consequently, the study cannot determine whether a specific drug, dose, timing, or combination was superior to another.

Fifth, PONV was assessed only during the first 24 postoperative hours and therefore did not capture later post-discharge symptoms.

Finally, because this was an observational secondary analysis, causal conclusions regarding the effectiveness of multimodal prophylaxis cannot be established.

Future Research
Future prospective studies should evaluate standardized, risk-based prophylactic strategies in larger and more diverse surgical populations. Such studies should incorporate detailed information regarding individual antiemetic agents, dose, timing, anesthetic technique, opioid-sparing analgesia, and PONV occurring both during hospitalization and after discharge.

Prospective comparative or randomized studies may further clarify whether escalation of prophylaxis according to predefined risk categories produces clinically meaningful reductions in PONV and rescue antiemetic requirements.

CONCLUSION

In this retrospective secondary analysis of adults undergoing elective surgery, postoperative nausea and vomiting affected 28.6% of patients during the first 24 postoperative hours.

PONV occurrence increased progressively with accumulation of established risk factors, from 8.7% among patients with no evaluated risk factors to 60.0% among those with all four risk factors. Previous PONV or motion sickness, female sex, postoperative opioid exposure, and prolonged anesthesia were independently associated with increased odds of PONV.

The intensity of prophylactic antiemetic therapy was also associated with postoperative outcomes. PONV occurred in 40.0% of patients receiving no prophylaxis, compared with 30.8% receiving single-agent prophylaxis and 14.1% receiving multimodal prophylaxis. Multimodal prophylaxis remained independently associated with lower odds of PONV after adjustment.

These findings support a structured perioperative strategy combining systematic risk assessment, reduction of modifiable emetogenic exposures, opioid-sparing analgesia when clinically appropriate, and risk-adapted multimodal antiemetic prophylaxis.

DATA AVAILABILITY

The data underlying this study were obtained from institutional clinical records. Individual-level patient data are not publicly available because of patient confidentiality and institutional data-protection requirements.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest related to this study.

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AUTHORS' CONTRIBUTIONS

All authors contributed to the conception or interpretation of the study, reviewed the manuscript critically, and approved the final version for submission.

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