



A CLINICAL AUDIT OF PERIOPERATIVE NAUSEA VOMITING PREVENTION AND MANAGEMENT PATHWAY AT NEPAL MEDICITI HOSPITAL

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ABSTRACT **Background** Postoperative Nausea and vomiting (PONV) are two of the common adverse events in the postoperative period. Though there has been advances in the field of medicine and surgery, PONV still continues to be a problem with evidence revealing high incidence rates of 20-30% in non-high-risk groups and up to 70% in high-risk groups. This is the first clinical audit of PONV at Nepal Mediciti Hospital after the implementation of departmental PONV pathway. **Methods** This audit assessed incidence of PONV in the first twenty-four hours in all post operative patients undergoing elective surgery under anesthesia over a year period between Jan 1, 2022, to Dec 31, 2022, by reviewing the medical records. **Results** Out of 4022 patients 28 (0.7%) had all 4 risk factors. 1122 (27.9%) had 3 risk factors. 1392 (34.6%) had 2 risk factors. 1094 (27.2%) had only one risk factor and 386 patients (9.6%) had no risk factors. 2912 (72.4 %) patients received Perioperative PONV prophylaxis. 1110 (27.6%) patients didn't receive perioperative PONV prophylaxis. 168 patients vomited whereas 3854 patients had no vomiting. 3716 (92.4 %) didn't have nausea and 306 (7.6%) patients had nausea. There was a call for management for PONV in 2.7% of the patients. 2% of the patients said that PONV interfered with daily activities. Overall, 27% patients didn't receive prophylaxis. **Conclusion** Our findings indicate that PONV management remains a significant target for improved clinical practice. Despite the extensive evidence base, strategies such as risk stratification, reduction of baseline risk and rational antiemetic prescription can be improved, especially in high-risk patients.

KEYWORDS : PONV: Post Operative nausea and vomiting, audit, prophylaxis, antiemetics

Background

Postoperative Nausea and vomiting (PONV) are two of the common adverse events in the postoperative period.¹ PONV remains a significant concern, as evidenced by incidence rates ranging from 20-30% in non-high-risk groups and up to 70% in high-risk groups. However, the lack of definitive data from Nepal makes it challenging to establish an optimal protocol for managing PONV. The availability of multiple guidelines further complicates the decision-making process for anesthesiologists, leaving them in a difficult situation. The effects of PONV can be significant and can include discomfort and distress to the patient, delayed recovery, dehydration and electrolyte imbalance, wound dehiscence, prolonged hospital stay and increased risk of complications like pulmonary aspiration and increase in pain intensity.² PONV is one of the worst experiences of a surgical patient and it reduces their satisfaction to the health services.³

It is important for healthcare providers to identify patients at increased risk of developing PONV and to implement preventive measures and effective treatment strategies to reduce its incidence and severity. We had not been using any clinical indicators to measure the impact of PONV in our setting. The Department of Anaesthesiology therefore developed and deployed a clinical Pathway for management of PONV with the use of available resources (figure 1.) on 1st January 2022 and decided to audit the pathway annually. Auditing clinical outcomes, indicators, and pathways related to PONV can help us to identify areas for improvement in PONV prevention and management, develop targeted interventions, and ultimately improve patient care and outcomes.

This is the first clinical audit of PONV at Nepal Mediciti Hospital after the implementation of PONV pathway. This audit examines the incidence of PONV with relation to risk factors and prophylaxis received by patients. The objective of this audit was to review the current incidence of postoperative nausea and vomiting from 1/01/2022 to 30/12/2022 at Nepal Mediciti and to compare our results with established benchmarks with respect to the number of risk factors present in a patient and to upgrade and improve the pathway.

Methods:

This audit assessed incidence of PONV in the first twenty-four hours in all post operative patients undergoing elective surgery under anesthesia over a year period between Jan 1, 2022, to Dec 31, 2022, by reviewing the medical records. The audit also calculated the rate of PONV prophylaxis administered, incidence of clinically important PONV and incidence of PONV according to the risk factors documented.

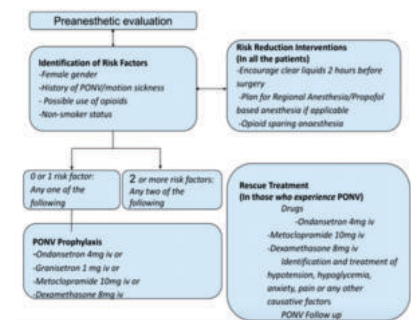


Figure 1: PONV pathway

The attending anesthesiologist stratified and recorded the risk factors, smoking status, female gender, history of PONV/motion sickness and possible use of opioids during preanesthetic checkup. The patients having one or no risk were considered as low risk for PONV and the patients having two or more risk factors are considered as high-risk patients for PONV. The anesthesiologist prescribed non-pharmacological methods and prophylaxis monotherapy to low risk patients and combined therapy regime to high-risk patients. The anesthetic nurse recorded the pharmacological prophylaxis and non-pharmacological methods recorded in anesthesia record form. The postoperative nurse recorded the frequency of nausea/vomiting and call for management of PONV during the first 24 hours. Once the PONV treatments needed to be deployed, a sub-group of patients would suffer 'clinically important' PONV with significantly impaired recovery⁴. For the purposes of auditing, we had defined "clinically important" cases of PONV as those in which patients experience vomiting three or more times or experience PONV symptoms that significantly interfere with their daily activities and delay hospital discharge. Once the PONV has been established, rescue antiemetics is given preferably from the group which wasn't given as prophylaxis. Ondansetron was given as rescue analgesic who hadn't received PONV prophylaxis. Allocated anesthesiologist collected and reviewed monthly data and recorded them in the Excel (Microsoft Corp., Redmond, WA, USA). The patients who had established hypotension, pain and hypoglycemia were excluded.

The audit focused on evaluating the PONV pathway and assessing the incidence of both PONV and clinically significant cases of PONV. The department of anesthesia should conduct an annual audit to evaluate the incidence of PONV and "clinically important" PONV cases, with the goal of ensuring that the actual incidence of PONV is lower than

predicted by risk scoring ensure and that the proportion of clinically significant PONV cases is less than 20% of all PONV cases. If the incidence of PONV is higher than 20%, the department of anesthesia should conduct a root cause analysis and make updates to their practices to align with “best practices”. The monitored indicators for the “best practices” are rate of administration of PONV prophylaxis as process indicator and Incidence of PONV and clinically important PONV during the first 24 hours as outcome measures.

Statistical Analysis

After the end of year consultant anesthesiologist compiled the monthly collected data and performed statistical analyses by using Excel (Microsoft Corp., Redmond, WA, USA). All categorical data were reported as percentage in tables, pie charts.

Series of patients undergoing elective surgery at our center from 1/01/2022 to 30/12/2022 were evaluated for percentage of patients experiencing PONV in the first 24 hours following surgery, percentage of patients who received PONV prophylaxis and percentage of patients who experienced 'clinically important' symptoms.

Results

Out of the series of the 4022 patients posted for elective surgery, 2409 patients (59.8%) were administered General anesthesia with endotracheal intubation, 386 patients (9.6%) were administered General anesthesia without endotracheal intubation. 1122 patients (27.9%) patients received regional anesthesia without opioids. 92 patients (2.3%) received regional anesthesia with iv or regional opioids. 12 patients (0.3%) surgery was performed under Monitored anesthesia care.

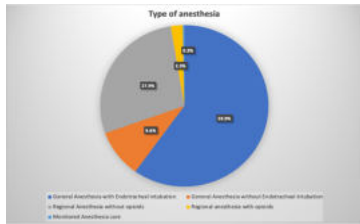


Figure 2: Type of anesthesia

3994 (99.3%) patients didn't have a previous history of postoperative nausea and vomiting. 28 patients (0.7%) had a previous history of PONV. Out of 4022 patients 2365 patients (58.8%) were female and 1657 (41.2%) were males. 3206 patients (79.7%) were non-smokers. 591 (14.7%) were smokers and 225 (5.6%) were past smokers. 52 patients (1.3%) had history of motion sickness and 3970 (98.7%) patients had no history of motion sickness. 2872 (71.4%) patients were identified as possible patients to receive opioids and 1150 (28.6%) were identified who possibly won't receive opioid. Out of 4022 patients, 2912 (72.4 %) patients received Perioperative PONV prophylaxis. 1110 (27.6%) patients didn't receive perioperative PONV prophylaxis.

Table 1: Use of Perioperative PONV prophylaxis

Use of perioperative PONV prophylaxis		
	Frequency	Percent
No	1110	27.6
Yes	2912	72.4
Total	4022	100

Out of 4022 patients 28 (0.7%) had all 4 risk factors. 1122 (27.9%) had 3 risk factors. 1392 (34.6%) had 2 risk factors. 1094 (27.2%) had only one risk factor and 386 patients (9.6%) had no risk factors.



Figure 3: Number of Risk factors

168 patients vomited whereas 3854 patients had no vomiting. 3716 (92.4%) didn't have nausea and 306 (7.6%) patients had nausea.

Table 2 : Nausea and vomiting according to the risk factors.

Total number of Risk Factors	Frequency	Percent	Nausea	Vomiting
0	386	9.6	13(3.45%)	0
1	1094	27.2	27(2.47%)	13 (1.19%)
2	1392	34.6	94 (6.75%)	54 (3.88%)
3	1122	27.9	160 (14.28%)	93 (8.29%)
4	28	0.7	14 (50%)	8 (28.57)
			308	168

There was a call for management for PONV in 2.7% of the patients. 2% of the patients said that PONV interfered with daily activities.

Table 3: Number of Risk factors and PONV prophylaxis

Total number of risk factors for PONV	0	1	2	3	4	Total
Granisetron	26	694	950	1069	0	2739
Granisetron, Metoclopramide	0	0	0	13	14	27
Metoclopramide	0	80	27	0	0	107
None	360	307	415	27	0	1109
Ondansetron	0	13	0	13	0	26
Ondansetron, Dexamethasone	0	0	0	0	14	14
	386	1094	1392	1122	28	4022

Even after the implementation of PONV pathway 27 patients with 3 risk factors didn't receive PONV prophylaxis. Overall, 27% patients didn't receive prophylaxis.

DISCUSSION

Our audit showed the percentage of female patients was 58.8% and males were 41.2%. The percentage of smokers was 14.7 %, non-smokers 79.7%, and 5.6% were past smokers. 99.3% had no previous history of PONV and 0.7% had a history of PONV. The Percentage of patients experiencing nausea in the first 24 hours following surgery was 7.6%, and vomiting was 4%, the percentage of patients who received PONV prophylaxis was 74.2%, and the percentage of patients who experienced 'clinically important' symptoms is 2%. 14.28% of patients with 3 risk factors had nausea and 8.33% had vomiting. 50% of patients with 4 risk factors had vomiting.

The percentage of PONV in the group of patients with 4 risk factors was 28.57%, with 3 risk factors was 8.29%, with risk factors 2 was 3.88%, with 1 risk factor was 2.47 % and with 0 risk factor was 3.45% is lower as compared to study done by Apfel et al¹ where they showed incidence of PONV in patients with 0, 1, 2, 3, and 4 risk factors is about 10%, 20%, 40%, 60%, and 80%, respectively. The lower incidence of PONV in our setting is exactly not known, however we believe that there could be many factors for it. First, we emphasized and encouraged our patients to consume clear liquids till 2 hours before the surgery. Recent publications also suggest that use of clear liquids till 2 hours before surgery reduced incidence of PONV.⁵ second, we used Opioid sparing anesthesia wherever applicable. The consumptions of opioids are not the scope of our audit. We incorporated ultrasound guided regional techniques as part of multimodal analgesia which could had resulted in decreased opioids consumptions.⁶ Thirdly, we used Propofol based anesthesia and Total Intravenous anesthesia wherever feasible. Celik et al has showed that propofol based anesthesia reduces the incidence of PONV.⁷ Fourth, we have used prophylactic anti emetic for all the patients whereas Biedler et al⁸ in their study didn't use prophylaxis in the low-risk group and showed incidence of PONV to be 13.6% that is higher as compared to our study which is 3.45 % for 0 risk factors and 2.47 % for 1 risk factor. So, the incorporation of Prophylaxis for low-risk groups in our pathway seems to provide better results in term of preventing PONV. If we look into the subgroup of patients with three risk factors 14.28% had nausea and 8.29% had vomiting and in subgroup of patients with 4 risk factors, 50% had nausea and 28.57 % had vomiting. These numbers are still high and may benefit from multimodal antiemetics which can be incorporated in the PONV pathway.

The side effects of the 5HT3 antagonists are headache, constipation,

wound infection, extrapyramidal symptoms, sedation, arrhythmia, and QT prolongation. Weibel S. et al⁹ showed that complication rate is very low. The incidence of headache could be increased by use of Ondansetron.

Our rate of prophylaxis administration was 74.2% which was similar to the study done by Habis et al (79%).¹⁰ 2.5% of patients with 3 risk factors for PONV didn't receive any prophylaxis. The issue of poor adherence to guidelines for the prevention of postoperative nausea and vomiting (PONV) is widely recognized and has been extensively discussed in the literature, as highlighted by Kranke et al.¹¹

We acknowledge the need for appropriate evaluation of "clinically important" PONV and use of scale such as Simplified PONV Impact Scale for auditing purposes.¹² For audit purpose, we defined clinically important PONV as PONV occurring three or more times or significantly interfering with daily activities and delaying hospital discharge. Our preliminary findings indicated that the percentage of clinically important PONV was calculated to be 2%. We recommend implementing validated PONV scales to accurately assess clinically important PONV in our department. Additionally, in cases where management of established postoperative PONV was required, calls were received in 2.7% of cases, which was consistent with our percentage of clinically important PONV. This further justifies the importance of accurately evaluating clinically significant PONV using validated scales in our practice.

We designed our pathway based on the PONV guideline published by Gan TJ et al¹³ and Stanford Medicine guideline.¹⁴ It was the first PONV pathway guideline in our setting. It was designed to proactively manage and prevent PONV through a standardized pathway, allowing attending anesthesiologists and nurses to optimize the incidence and severity of PONV. We planned for appropriate prophylactic antiemetics during pre-anesthetic checkups and ensured rescue antiemetics in postoperative ward. Although evaluating patient satisfaction index was not within the scope of the audit at that time our updated pathways would incorporate many other clinical indicators, including patient satisfaction index. We were able to estimate the incidence of nausea and vomiting, clinically important PONV, and the rate of prophylactic antiemetics. We evaluated our pathways, identified any shortcomings, and assessed our anesthesia techniques. We formulated updates required for the pathway and submitted recommendations to our department.

Recommendations

We recommended following to the Department.

1. Though the overall PONV incidence is low it is still high in the high-risk groups. So, it would be better to revise the Pathway and incorporate drugs from other pharmacological group and other non-pharmacological methods to further improve the PONV incidence.
2. To improve the compliance of pathway by periodic trainings and discussions.
3. Upcoming audits should add clinical indicators like patient satisfaction, Simplified PONV Impact Scale, total opioids used, NPO hours, exact population of patients who adhered to the advice of consuming clear liquids till 2 hours prior to surgery.
4. The time taken for the surgery and type of surgery should also be recorded as they can themselves be a risk for PONV.
5. To incorporate pediatric population in the upcoming audits.

Limitation of audit and pathway

We had not included pediatric population in our audit.

There were fewer patients in the group with 4 risk factors.

The actual number of patients who adhered to the general measures which we believe is one of the reasons for lesser incidence of PONV is unknown.

CONCLUSION

Our findings indicate that PONV management remains a significant target for improved clinical practice. Despite the extensive evidence base, strategies such as risk stratification, reduction of baseline risk and rational antiemetic prescription can be improved, especially in high-risk patients. Follow up audit would give us a clear picture.

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