Correlation of Ondansetron Timing in Postoperative Nausea and Vomiting: A Retrospective Evaluation Amongst Adult Patients Receiving General Anesthesia

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Background

Addressed as a national quality initiative by the Centers for Medicare and Medicaid Services (CMS), postoperative nausea and vomiting (PONV) is a vexing complication requiring further attention by anesthesia providers.[3] Medication optimization is an area of focus to address this complication.[4] Ondansetron, a selective 5-hydroxytryptophan subtype 3 (5-HT_3) receptor antagonist, is effective and considered the "gold standard" in the prevention of PONV.[4] GlaxoSmithKline™ suggests administering Zofran® (ondansetron) before the induction of anesthesia.[5] These directions are in contrast to the synthesis of the research evidence, which supports increased effectiveness of ondansetron when administered 30 minutes before emergence from anesthesia.[4]

The purpose of this evidence-based practice (EBP) project was to evaluate ondansetron timing, report the incidence proportion of PONV among adult general surgical patients and evaluate rescue antiemetics utilized at 2, 6, and 24 hours postoperatively.

Methods

- A retrospective, EBP project was conducted at Providence Sacred Heart Medical Center (PSHMC) and Providence Holy Family Hospital (PHFH) in Spokane, WA.
- Permission was obtained by the facility and exemption determination was granted by the IRB.
- Patient data was securely extracted and stored in a HIPPA complaint REDCap database. Patient data was fully de-identified. Data extraction included all surgeries receiving general anesthesia from October 1, 2018, to September 30, 2019.
- Inclusion criteria: Adult patients 18-90 years old, general surgery (ETT, LMA) using volatile inhalational agents, admitted for 24hrs.
- Exclusion Criteria: Pediatric, obstetric, direct admission to ICU, postoperative intubation requirements in PACU.
- PONV outcome was determined by nursing documentation of PONV scale or administration of antiemetic medication.
- Descriptive data analysis was completed and stratified by ondansetron timing. Independent risk factors was determined and controlled for using a binary logistic regression. Level of significance set at 0.05.

Findings

Table 1: Baseline Demographic and Clinical Characteristics

	(N=8,365)	%
Apfel risk factors:		
Female gender	4,413	54%
Non-smoker	6,527	79%
Postoperative opioid use	4,755	59%
History of PONV/motion sickness	655	8%
Ondansetron timing:		
Induction	1,577	19%
Emergence	3,812	46%
None	2,976	36%
Case type:	**Induction (%)**	**Emergence (%)**
Elective	1,032(66)	2,786(73)
Emergent	15(1)	63(2)
Urgent	523(33)	953(25)
Trauma	3(0.2)	7(0.2)
	Mean	**SD**
Age (years)	61	16
Number of Apfel risk factors	2	1
	Median	**IQR**
Duration in PACU	69	53-92
Duration of surgery (minutes)	144	110-201

Table 2: PONV Incidence Proportion in 24 hours* (n=5,365)

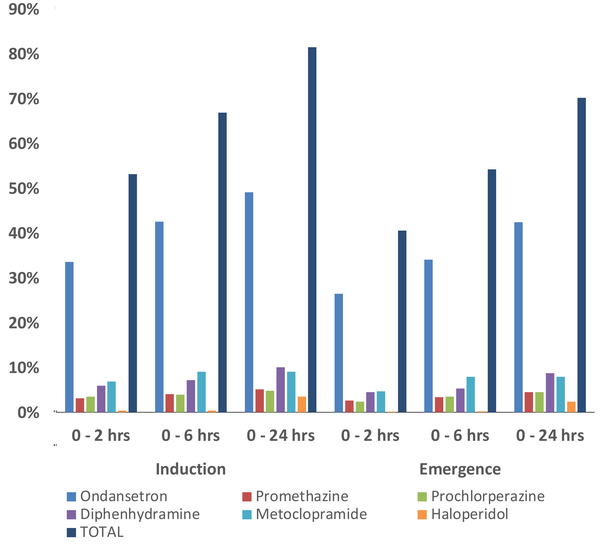
Variable	OR	95% CI	P Value
Ondansetron timing:			
Emergence	0.79	0.69 – 0.89	<0.0001

*Fully adjusted model controlling for Apfel risk factors, age < 50 years, case duration, high risk procedures (gynecological, cholecystectomy, and laparoscopy)

Table 3: PONV Proportion Based on Ondansetron Timing

	Intervention	PONV	No PONV	Risk	RR	95 % CI	P-value
0 – 2 hrs	Emergence	1,387	2,678	34%	0.77	0.72 – 0.82	<0.0001
	Induction	822	1,021	45%			
0 – 6 hrs	Emergence	1,818	2,247	45%	0.81	0.77 – 0.86	<0.0001
	Induction	1,013	830	55%			
0 – 24 hrs	Emergence	2,249	1,816	55%	0.88	0.84 – 0.92	<0.0001
	Induction	1,159	684	65%			

Figure 1: Postoperative Rescue Antiemetics



Discussion

The literature reports approximately 30% of patients who undergo general anesthesia will be affected by PONV.[1,2,4] In addition, research evidence supports ondansetron administration during emergence of anesthesia as an avenue to combat the incidence of PONV.[4] This project mirrored the literature by correlating a relationship between ondansetron timing administration on emergence and reducing the risk of PONV at 2, 6, and 24 hours. When controlling for Apfel risk factors and confounding bias, this project's PONV incidence was consistent with literature, depicting a reduction in PONV incidence at 2, 6, and 24 hours. The prevalence of a rescue antiemetic medication at 2, 6, and 24 hours postoperatively was also statistically significant for the emergence group when compared to the induction group.

Understanding the pharmacokinetics of ondansetron, especially its half-life of 3.8 (+/- 1) hours, provides insight regarding the length of time serotonin receptors may be blocked, and thus prevention of subsequent PONV occurrences.[6]

Of the patients that received ondansetron at PSHMC and PHFH, 71% of patients received ondansetron on emergence. Anesthesia providers should continue to tailor prophylactic antiemetic administration based on patient selection and antiemetic pharmacokinetic profiles.

References

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