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POST-OPERATIVE NAUSEA AND VOMITING IN ADULTS

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INTRODUCTION

Post operative nausea and vomiting (PONV) is a common concern for patients and anesthesia providers alike. PONV is estimated to affect 20-40% of patients undergoing surgery with general anesthesia, and up to 80% of high-risk patients (Cao, 2017).

PONV is a common surgical complication and is a leading cause of unexpected hospital admission in ambulatory care patients. Patients report discomfort and dissatisfaction with PONV and report that "the avoidance of PONV is a greater concern than avoidance of post operative pain" (Gan et al, 2003). PONV can increase time spent in the recovery room, expanded nursing care, and can increase total healthcare costs (Gan et al, 2013).

In our current healthcare climate, the phrase "patient satisfaction" is a hot buzzword. Patients are asked to fill our surveys about their healthcare experience and rate their satisfaction and it is directly linked to reimbursement. Since the risk for PONV can be quite high, it can affect many people having surgery. Appropriately screening and interventions can prevent PONV and increase patient satisfaction scores.

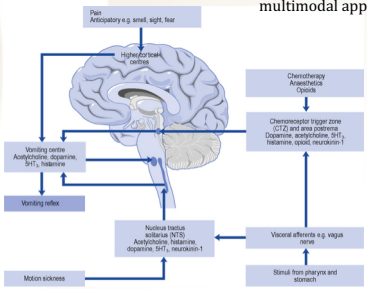
As a student nurse anesthetist, it is part of my pre-operative patient assessment to screen patients for PONV, and ask about a history of previous PONV or motion sickness. In my short time in the operating room, I have seen variations in the management technique and incidence of PONV. As an advanced practice provider, I have the autonomy to choose PONV prophylaxis for my patients. I chose to complete this project in order to learn more about a complex and not widely understood topic. I want to increase my knowledge base and select appropriate medication therapy for my patients and ultimately provide the best patient care by following evidence based practice.

SIGNS AND SYMPTOMS OF PONV

- Feeling nauseous
- Uneasy feeling in stomach
- Churning or cramping in abdomen
- Heartburn
- Gagging
- Inability to tolerate water or light food
- Vomiting

PATHOPHYSIOLOGY AND SIGNIFICANCE

- PONV is a complex issue and involves many different receptors and pathways in the body.
- Nausea is described as "an unpleasant sensation referred to a desire to vomit not associated with expulsive muscular movement" (Shaikh et al, 2016).
- Vomiting is described as "a forceful expulsion of even a small amount of upper gastrointestinal contents through the mouth" (Shaikh et al, 2016).
- Nausea and vomiting are responses to certain stimuli from vestibular, olfactory, visual, and psychomotor sources (Cruthirds, 2013).
- Triggers for PONV occur preoperatively (fear, anxiety), intraoperatively (medications, type of surgery, etc.), and postoperatively (pain).
- The five major pathways involved with the development of PONV are:
 - Chemoreceptor trigger zone (CRTZ)
 - Vagal mucosal pathway in gastrointestinal system
 - Neuronal pathways from vestibular system
 - Reflex afferent pathways from cerebral cortex
 - Midbrain afferents
- Stimulation of any of the afferent pathways can activate vomiting via muscarinic (cholinergic), histaminergic, dopaminergic, or serotonergic receptors (Shaikh et al, 2016).
- The CRTZ is triggered by neurotransmitters including dopamine, serotonin, histamine, acetylcholine, substance P, and adrenaline (Cruthirds, 2016).



<https://basicmedicalkey.com/nausea-and-vomiting/>

RISK FACTORS

- Risk factors for PONV include the following: (Gan et al, 2016)
 - Female gender
 - Nonsmoker
 - History of PONV/motion sickness
 - Postoperative opioids
- Apfel scoring system:
 - A validated tool to screen patients for risk factors for PONV. The presence of one risk factor correlates with a 20% increased chance of PONV. Every additional positive risk factor increases the chance of PONV by 20% each. (Gan et al, 2014).
- Surgeries that increase risk for PONV include: (Gan et al, 2016)
 - Breast surgery
 - Gynecological surgery
 - Laparoscopic surgery
 - Cholecystectomy surgery
 - Ophthalmic surgery
 - Dental surgery
 - Ear, nose, and throat surgery
- Increased duration of surgery:
 - "Increasing operative duration by 30 min may increase the risk of PONV by 60%" (Shaikh et al, 2016).

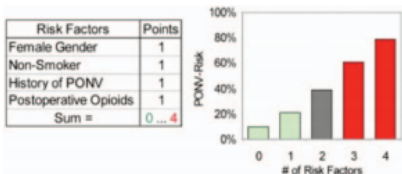


Figure 1. Risk score for PONV in adults. Simplified risk score from Apfel et al.⁹ to predict the patient's risk for PONV. When 0, 1, 2, 3, and 4 of the risk factors are present, the corresponding risk for PONV is about 10%, 20%, 40%, 60%, and 80%, respectively. PONV = postoperative nausea and vomiting.

Gan, T., Diemunsch, P., Habib, A., Kovac, A., Kranke, P., Meyer, T., Watcha, M., Chung, F., Angus, S., Apfel, C., Bergese, S., Candiotti, K., Chan, M., Davis, P., Hooper, V., Lagoo-Deenadayalan, S., Myles, P., Nezat, G., Philip, B., Tramer, M. (2014). Consensus Guidelines for the Management of Postoperative Nausea and Vomiting. *Anesthesia & Analgesia*. 118 (1). 85-113.

PRE OP TREATMENT INTRA OP TREATMENT

- Anticholinergics:
 - Scopolamine patch
- NK-1 receptor antagonists
 - Aprepitant (Emerge)
- Other methods:
 - NSAIDs
 - COX 2 inhibitors
 - Gabapentin
- 5HT3 receptor antagonists:
 - Ondansetron
 - Ramosectron
 - Palonosetron
- NK-1 receptor antagonists
- Corticosteroids
 - Dexamethasone
 - Methylprednisolone
- Butyrophenones:
 - Haloperidol
 - Droperidol
- Antihistamines:
 - Mecizine
- Other Antiemetics:
 - Propofol
 - Alpha 2 agonists (clonidine, dexmedetomidine)
 - Mirtazapine
 - Midazolam
- Recommended to give IV Dexamethasone (4-5mg up to 8mg) after airway induction. (Gan et al, 2016).
- Recommended to give IV Zofran (4mg) immediately prior to the end of surgery. (Cao, 2017)

RECOMMENDATIONS

- A **multimodal** approach, combining medications from the 5 drug classes (5HT3 receptor antagonists, NK-1 receptor antagonists, corticosteroids, butyrophenones, and anticholinergics) to block different receptors.
- Do not medicate every patient for PONV because it places them at risk for rare but well-described side effects from medications (Gan et al, 2014).
- Avoidance or decrease of high risk medications listed below:

HIGH RISK MEDICATIONS THAT CAN CAUSE PONV

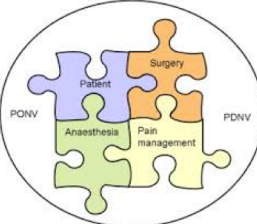
- Volatile anesthetics (Sevoflurane, Desflurane, Isoflurane, Halothane)
- Etomidate
- Ketamine
- Nitrous Oxide
- Neostigmine
- Intra and post operative opioids

IMPLICATIONS FOR NURSING CARE

- Preoperative nurses, certified registered nurse anesthetists (CRNAs), post anesthesia care unit nurses, and MDs all have a role in the prevention and treatment of PONV.
- Pre-op nurses must be able to identify moderate to high risk patients and advocate the need for prophylactic pre-op medication such as aprepitant or a scopolamine patch to be applied before the patient enters the operating room.
- CRNAs and MDAs must do a thorough pre-operative assessment to identify those at high risk for PONV and formulate a plan (single vs. multimodal approach and correct choice of drug and timing) and implement this in the operating room.
- PACU nurses must be able to identify high risk populations, intervene early, and advocate for rescue medication for PONV patients who were either under dosed or for whom PONV prophylaxis failed.

RISKS OF PONV

- Wound dehiscence
- Disruption of sutures
- Aspiration
- Dehydration
- Electrolyte imbalances
- Increased pain
- Esophageal rupture
- Hematoma formation



<https://www.sciencedirect.com/science/article/pii/S1743919115000424>

CONCLUSION

- PONV is a surgical complication that affects between 20-40% of surgical patients.
- PONV negatively affects patients, increases time to discharge, and increases healthcare costs.
- A thorough pre-operative screening can identify risks factors for PONV and high risk patients.
- Tailoring an anesthetic plan that minimizes risk factors for PONV for each individual patient should be implemented.
- Premedication with NSAIDs/COX 2 inhibitors reduces the need for opioid medications (Obrink, 2015).
- Use of local anesthesia or regional anesthesia are favorable to reduce PONV (Obrink, 2013).
- Use of total IV anesthesia (TIVA) during surgery so volatile anesthetics do not have to be used can decrease risk for PONV.
- The use of Propofol for TIVA can decrease the risk of PONV as Propofol has an antiemetic effect.
- A team approach to reducing PONV increases patient satisfaction and decreases patient discomfort.

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