POST-OPERATIVE NAUSEA AND VOMITING: NOT A BLACK AND WHITE ISSUE

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Post-operative nausea and vomiting (PONV) is the most common post-operative adverse event, with a reported occurrence rate of 35-50% for all patients affected.

Costly results of PONV include prolonged recovery room stays or hospital admissions.

Additional risks include: aspiration, surgical wound dehiscence, and increased lost time from work.

(American Society of Peri-Anesthesia Nurses[ASPN], 2006)
“85% recover with no complications, 60% of the 15% will have a slower recovery rate, and the remaining 40% of the 15% may need additional treatment…”
Specific areas of the brain are involved with the sensation of nausea and the reflex mechanisms of vomiting which is collectively referred to as the emetic response. The vomiting center is located in the medulla oblongata and responds to activation of 5 different receptors: serotonin3 (5HT3), dopamine2 (DA2), muscarinic cholinergic (M), histamine 1 (H1), and neurokinin1 (NK1). The vomiting center can be stimulated directly by activation of H1 and M receptors through the vestibular apparatus in the inner ear, by sensory input (smell, vision, pain) and through activation of higher centers in the brain (fear, memories, or extreme anticipation). The vomiting center can also be stimulated indirectly through the chemoreceptor trigger zone (CTZ) which is also located in the brain. CTZ is activated by the vagal afferents in response to activation of the 5HT3 receptors located in the small intestines and stomach, or by chemotherapy, opioids, ipecac, and anesthetic agents in the blood (blood-borne emetics), or through activation of DA2 or NK1 receptors. Once activated the vomiting center sends signals directly to the diaphragm, abdominal muscles and the stomach and vomiting results. Effective blocking of the triggering receptors (5HT3, DA2, M, H1 and NK1) will arrest the process, hence most antiemetic medications are antagonist of the prior mentioned receptors (Lehne, 2010)
Assessment for pre-operative PONV should be completed prior to leaving the pre-operative area by the holding room nurse or the anesthesia provider. Patients meeting 1 or more risk factors should be pre-medicated to prevent PONV. Risk factors listed Below:

- Female gender
- Prior history of PONV
- Subjective history of motion sickness
- Nonsmoker
- Post-operative use of opioids
- Use of inhaled anesthetic gases
- Use of Nitrous Oxide
- Duration of surgery
- Dehydration
- Type/site of surgery (abdominal rating the highest)

(ASPAN, 2006)
27 year old female status post emergent total abdominal hysterectomy. She is 15 minutes into her recovery from general anesthesia in the post-anesthesia care unit. She is still sedated but responds to voice and is complaining of nausea. Her Vital signs are as follow's: heart rate 110, blood pressure 90/58, SpO2 99% on 40% aerosol face tent, respiratory rate 18 and non-labored. EBL1200, UOP not measured. PMH significant for seasonal allergies, motion sickness, and previous history of post-operative nausea after repair of ulnar fracture. NKDA, medications Prenatal vitamin once daily.

Total number of PONV risk factors: ____?
EVALUATION OF CASE STUDY

- Did this patient meet criteria for pre-operative PONV prophylaxis?
- Which risk factors did she meet?
- What treatments can be offered now post-op to avoid PONV?
- First, a review of the prophylaxis treatments
Assessment for pre-operative PONV should be completed prior to leaving the pre-operative area by the holding room nurse or the anesthesia provider. Patients meeting 1 or more risk factors should be pre-medicated to prevent PONV, these preventative treatments include:

- Administration of non-steroidal anti-inflammatory drug (acetaminophen) pre-op to decrease opioid need post-operative
- Dexamethasone
- Zofran
- Benadryl
- Scopolamine patch
- Droperidol
- Hydration
- Pain management
- Complementary interventions
**NSAID-ACETAMINOPHEN**

- Adult doses of extended release acetaminophen: 1300mg Q 8 hours, not to exceed 3900mg/24 hours.

- Contraindicated in patients with active liver disease, ETOH consumption, and those on Coumadin

**Action:** Acetaminophen is part of the non-steroidal anti-inflammatory medications. These medications inhibit cyclooxygenase which is the catalyst for the formation of prostaglandins. After cell injury, prostaglandins cause fever, inflammation and pain responses.

(Lehne, 2010, p.840)
DEXAMETHASONE

- Adult dose 10-20 mg IV, may give 4-8mg 6 hours later

- Contraindicated in patients with peptic ulcer disease, active infections, or allergies to dexamethasone

- ACTION: Classified as a glucocorticoid, exact antiemetic action is unknown and use as an antiemetic off label use (not approved by the FDA for such indication)

- Serious side effects are absent as antiemetic use as the therapy duration of this drug for the treatment of PONV is intermittent and short term.

(Lehne, 2010 p.937)
ZOFRAN

- Adult dose 16 mg (tablet) PO 1 hour prior to surgery, post-op 4mgIV
- Contraindication: pre-existing prolonged QT interval (FDA prolonged QT black box warning)
- Action: Zofran (Ondansetron) is one of four serotonin receptor antagonist. The specific receptor involved 5-Hydroxytryptamine (5-HT3) located in the chemoreceptor trigger zone (CTZ) and the vagal afferents. The CTZ is activated by either indirect acting stimuli from the intestines or stomach via vagal nerve, or direct action of certain nausea inducing drugs (chemotherapy, opioids, or anesthetic agents) via blood stream.
- Side effects: Patient should be on EKG monitoring if potential for electrolyte imbalance (hypokalemia or hypomagnesaemia) congested heart failure, bradycardia, and to observe for any changes in QT interval.

*Prolonged QT interval increases the risk of ventricular arrhythmias (Lehne, 2010 p.937; ASPAN, 2006)
ANTI-HISTAMINE: BENADRYL

- Adult dose of Benadryl (diphenhydramine) 25-50 mg IV/PO/IM Q6-8 hours

- Action: first generation H1 antagonist also as incidence blocks the muscarinic receptors located on the neural pathway between the vestibular apparatus of inner ear and the vomiting center in the brain.

- Side effects: sedation (excitation in the pediatric population), dizziness, and fatigue.

- Anticholinergic actions lead to mucous membrane drying and rarely acute toxicity.

- Signs and symptoms of acute toxicity: dilated pupils, tachycardia, hypereflexia, flushed face, dry mouth, and urinary retention

(Lehne, 2010, p.823)
SCOPALOMINE PATCH

Adult dose: 1 patch (0.5mg) placed behind the patient’s ear over the mastoid process Q72 h also available in s form 0.4-0.8mg PO Q8h PRN

Action: anticholinergic drug (muscarinic antagonist, 123) competes with acetylcholine for muscarinic receptor sites in the parasympathetic nervous system. (119) Blocking the pathway from the vestibule inner ear to the vomiting center (938) Muscarinic receptors are located on glands in the following organs: lungs, the gastrointestinal tract, and on the skin in sweat glands. (112) By competing with acetylcholine these glands are suppressed and secretions are decreased.

Side effects: dry mouth, dizziness, blurred vision
(Lehne, 2010, p.941)
• Adult dose 2.5-5 mg IM/IV Q4-6 hours (937)

• Action: classified as a butyrophenones, acts by blocking the dopamine 2 receptors in the CTZ, interrupting the stimuli prior to reaching the vomiting center of the brain.

• Side effects: sedation, hypotension, prolonged QT, hence patients receiving droperidol must be on continuous EKG monitoring to assess for any changes in the QT interval

(Lehne, 2010 p.939)
NON-PHARMACOLOGICAL PREVENTION OF PONV

ASPAN’s guidelines for the prevention of PONV includes in addition to medications, the following actions have evidence of decreasing/preventing PONV:

- **Hydration**- due to NPO status and fluids lost during surgery, post-operative patients are frequently still in fluid deficits. Recommended IV fluid doses range from 15-40ml/kg of Ringers Lactate for hydration is encouraged.
- Post-operative **pain** relief-use a multi-modal approach, ice/heat, repositioning, NSAIDs opioids, and request regional blocks when appropriate
- **Complimentary interventions**- over the counter acupressure and acustimulation devices can be purchased pre-op and brought in on day of surgery for patients who at high risk for PONV. Aromatherapy-alcohol swabs have been shown to decrease PONV in some patients. Ginger ale containing real ginger has also been shown to Decrease PONV in many patients

(ASPAN, 2006)
POST-OPERATIVE MANAGEMENT

• Previous review of the antiemetic medications including the different receptor sites each was specific for. Peri-operative nurses are encouraged to ensure at least one medication that blocks activation of the CTZ and one that blocks a route of activation for the vomit center are given pre or intra-op.

• Use of medications that block a different receptor site than those previously given are encouraged for PONV presenting in the post-operative phase.

• Use caution with all anti-emetics having sedation as a side affect as lingering anesthesia can potentiate these side effects!

• Ask your patient what has helped PONV in the past, they may know what has worked best for them.

• Assess patient for signs and symptoms of dehydration and replace fluid as needed.
• Did this patient meet criteria for pre-operative PONV prophylaxis? YES

• Which risk factors did she meet? Female, prior history of PONV, Motion sickness, non smoker, use of inhaled anesthetic gases, dehydration (she was hypotensive, tachycardic and large EBL), and she had had abdominal surgery (total 7 risk factors, very high risk)

• What treatments can be offered now post-op to avoid PONV? Hydration, antiemetics that work on a different receptor site than those she received pre/intra-op., consider IV anti-inflammatory if one was not given pre-op, Alcohol prep for aroma-therapy, question patient what has worked in the past.


“Surgery is scheduled for six weeks from today. Don’t eat anything before then”