

Episode 42: Post-op Nausea and Vomiting (PONV)

On this episode: Dr. Jed Wolpaw

In this episode, episode 42, I discuss Post-op Nausea and Vomiting (PONV). I discuss risk factors, complications, treatment and prevention and side effects.

UPDATE April, 2018: In this episode I mention that the evidence is not good for Midazolam in preventing PONV. However, a good friend and colleague, Dr. Michael Grant, did a nice [meta-analysis](#) of available trials which concluded that it actually does work fairly well.

Table of Contents

Hyperlinks to section of notes.

PREVALENCE	2
ADULT RISK FACTORS	2
PEDIATRIC RISK FACTORS	2
PATHWAY	3
PREVENTION AND TREATMENT	3
SUGGESTIONS FOR MANAGEMENT	4
POST DISCHARGE NAUSEA AND VOMITING	4
SIDE EFFECTS	4
REFERENCES	5

Prevalence

- 30% of patients will have post-op nausea and vomiting (PONV) after surgery
- Potential institution consequences: increased cost, increased admission (if surgery was done in ambulatory setting), increased length of stay (inpatient setting)
- Potential patient consequences: suture dehiscence, aspiration, esophageal rupture, ↑ ICP, pneumothorax

Adult Risk Factors

- Apfel Score:
 - Female (post-puberty)
 - Non-smoker
 - History of motion sickness or prior PONV
 - Use of post-operative opioids
- Risk stratification:
 - No risk factor = 10% risk
 - One risk factor = 20% chance
 - Two risk factors = 40% chance
 - Three risk factors = 61% chance
 - Four risk factors = 79% chance
- Other risk factors:
 - Age < 50 y.o.; RR = 2.0
 - History of chemotherapy related nausea and vomiting; RR = 2.0
 - Volatile anesthetic; RR = 2.3 to 2.4 → risk limited to early post-op period
 - Propofol is protective; ↓ risk by 20%
- Nitrous oxide has controversial relationship to PONV
 - Fernández-Guisasola and colleagues published [study](#) showing small increased risk for women, but antiemetic medications eliminated increased risk
- Neostigmine and glycopyrrolate has not been proved by studies to increase risk for PONV

Pediatric Risk Factors

- Risk score:
 - Age >3
 - Duration of surgery > 30 minutes
 - Strabismus surgery
 - History of PONV or family relative with PONV
 - Risk stratification:
 - No risk factor = 10% risk
 - One risk factor = 30% chance
 - Two risk factors = 50% chance
 - Three or four risk factors = 70% chance
 - If take out strabismus surgery in risk score:
 - None = 3% risk
 - One risk factor = 11% chance
 - Two risk factors = 30% chance
 - Three risk factors = 40% chance
-

Pathway

- Receptors involved: muscarinic 1 receptor, dopamine 2 receptor, histamine 1 receptor, 5HT3 receptor, neurokinin-1 (NK1) receptor
- Central stimulation: vestibular system → central pattern generator (vomiting center) in medulla
- Peripheral stimulation: irritation of GI tract, overly full stomach → nucleus tractus solitaries in brainstem → area postrema (chemoreceptor trigger zone) at base of fourth ventricle in medulla → communicates with central pattern generator

Prevention and Treatment

- Combination therapy more effective than monotherapy → want multimodal therapy
 - **NSAIDs**: exert mechanism by ↓ opioids used
 - o Studies not as clear about Tylenol use
 - **TIVA**: better than volatile anesthetics in the immediate post-op period; ↓ risk by 25%
 - **Decadron** (dexamethasone): ↓ risk by 25%
 - o 4 to 8mg at beginning of case; studies have not been clear on if 8mg is better than 4mg
 - **5HT3 receptor antagonist** (eg. Zofran aka. ondansetron): ↓ risk by 25%
 - o Studies have not shown when it is best given
 - **Droperidol**
 - o Removed from US because black box warning of increased risk of Torsades des pointes
 - **Metoclopramide** (Reglan): promotility agent → studies have not shown it to be effective
 - **Transdermal scopolamine**: ideal is put on night before
 - o Even more effective when used with dexamethasone
 - **NK1 receptor antagonist**: studies shown even more effective than Zofran
 - o Aprepitant 40 to 80mg PO; ½ life 40 hours
 - o Rolapitant (newer NK1 receptor antagonist); ½ life 180 hours
 - **Acupuncture points/pressure points**: have been shown to ↓ PONV
 - **Fluid**: conflicting evidence regarding if ↑ fluid prevents PONV
 - o ERAS recommends being restrictive with fluids
 - **Haldol**: 1mg IV/PO/IM
 - **Diphenhydramine**: antihistamine ↓ risk by 25%
 - o Side effects: sedation, dry mouth, dizziness, urinary retention, confusion and delirium
 - o Because of side effects, not used as much
 - **Phenothiazines**: have extrapyramidal side effects
 - o Eg. promethazine (phenergan) 6.25 to 12 mg → do not push b/c risk of side effects
 - o Eg. prochlorperazine 5 to 10 mg
 - **Reglan**: not as effective and have side effects which are 20x more common in kids than adults
 - o Side effects: hypotension, tachycardia, extrapyramidal symptoms
 - **Benzodiazepines**: not great evidence for efficacy
 - Isopropyl alcohol (smelling) has been shown to help for a little bit
 - Low dose naloxone infusion 0.25mcg/kg/hr if nausea is related to opioid use
 - Ephedrine 25mg mixed w/ 25mg hydroxyzine IM
 - o Ephedrine cause hypertension and hydroxyzine cause a little hypotension
-

Suggestions for Management

- Want to use different medicine for treating than for prevention
- Patients with ≥ 4 risk factors should have three or more interventions
- Prophylactic strategy recommended by article that published Apfel score:
 - o 0 risk factor \rightarrow don't have to do anything
 - o 1 risk factor \rightarrow 4mg dexamethasone \pm second antiemetic at end of case
 - o 2 risk factors \rightarrow avoid volatile anesthetics, 4mg dexamethasone \pm second antiemetic at end of case
 - o 3 risk factors \rightarrow avoid volatile anesthetics, 4mg dexamethasone, AND second antiemetic at end of case
 - o 4 risk factors \rightarrow avoid volatile anesthetics, 4mg dexamethasone, NK1 receptor antagonist, and prophylactic antiemetic

Post Discharge Nausea and Vomiting

- Post Discharge Nausea and Vomiting = nausea and vomiting at home which could bring patient back to hospital
- Risks:
 - o Female
 - o Age < 59
 - o History of PONV
 - o Received opioids in PACU
 - o Nausea w/o vomiting in PACU
- Risk stratification:
 - o No risk factor = 7% risk
 - o 1 risk factor = 20% risk
 - o 2 risk factors = 28% risk
 - o 3 risk factors = 53% risk
 - o 4 risk factors = 60% risk
 - o 5 risk factors = 90% risk
- Management: give prescription for Zofran; consider scopolamine patch for longer lasting

Side Effects

- For all anti-emetics except dexamethasone and NK1 inhibitors \rightarrow prolong QT interval
 - o Newest 5HT3 antagonist, Palonosetron, does not prolong QT; has $\frac{1}{2}$ life 40 hours
- Treat extrapyramidal side effects with Benadryl, Bzotropine or Pramipexole
- Dexamethasone increases blood glucose levels and there is controversy if 4mg impacts wound healing
- Scopolamine causes dry mouth, burry vision, agitation, confusion in older adults
- NK1 receptor antagonist have low risk profile, potentially low chance of urinary retention and confusion

#What do you do in your practice? Do you use some of these, or all of these?

#Do you have access to the NK1 receptor antagonists? Or Palonosetron? Do you use them? How effective are they?

#Does your hospital have a specific regimen?

References

Smith HS, Smith EJ, Smith BR. Postoperative nausea and vomiting. Ann Palliat Med. 2012 Jul;1(2):94-102. doi: 10.3978/j.issn.2224-5820.2012.07.05.

<https://www.ncbi.nlm.nih.gov/pubmed/25841469>

DiLustro J. Postoperative Nausea and Vomiting: 168 Years in Review. J Anest & Inten Care Med. 2017 Feb; 1(4): doi: 10.19080/JAICM.2017.01.555570

<https://juniperpublishers.com/jaicm/JAICM.MS.ID.555570.php>

Grant MC, Kim J, Page AJ, et al. The Effect of Intravenous Midazolam on Postoperative Nausea and Vomiting: A Meta-Analysis. Anesthesia & Analgesia: 2016;122(3); 656–663.

<https://www.ncbi.nlm.nih.gov/pubmed/26332858>

Apfel CC, Läärä E, Koivuranta M, Greim CA, Roewer N. A simplified risk score for predicting postoperative nausea and vomiting: conclusions from cross-validations between two centers. Anesthesiology. 1999 Sep;91(3):693-700.

<https://www.ncbi.nlm.nih.gov/pubmed/10485781>

Comments or suggestions? Please email accrac@accrac.com or leave a comment on the [website](#).

Fan of the show? Please take a moment to leave a comment and a rating to help others find the show!

Want to support the show? Patreon.com/ACCRA to become a patron and support the making of the show,
or donate to paypal.me/ACCRA

Notes by [April Liu](#)