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.
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:
  o Female (post-puberty)
  o Non-smoker
  o History of motion sickness or prior PONV
  o Use of post-operative opioids
- Risk stratification:
  o No risk factor = 10% risk
  o One risk factor = 20% chance
  o Two risk factors = 40% chance
  o Three risk factors = 61% chance
  o Four risk factors = 79% chance
- Other risk factors:
  o Age < 50 y.o.; RR = 2.0
  o History of chemotherapy related nausea and vomiting; RR = 2.0
  o 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
  o 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:
  o Age >3
  o Duration of surgery > 30 minutes
  o Strabismus surgery
  o History of PONV or family relative with PONV
- Risk stratification:
  o No risk factor = 10% risk
  o One risk factor = 30% chance
  o Two risk factors = 50% chance
  o Three or four risk factors = 70% chance
- If take out strabismus surgery in risk score:
  o None = 3% risk
  o One risk factor = 11% chance
  o Two risk factors = 30% chance
  o 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
  - 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%
  - 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%
  - Studies have not shown when it is best given
- **Droperidol**
  - 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
  - Even more effective when used with dexamethasone
- **NK1 receptor antagonist:** studies shown even more effective than Zofran
  - Aprepitant 40 to 80mg PO; ½ life 40 hours
  - 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
  - ERAS recommends being restrictive with fluids
- **Haldol:** 1mg IV/PO/IM
- **Diphenhydramine:** antihistamine ↓ risk by 25%
  - Side effects: sedation, dry mouth, dizziness, urinary retention, confusion and delirium
  - Because of side effects, not used as much
- **Phenothiazines:** have extrapyramidal side effects
  - Eg. promethazine (phenergan) 6.25 to 12 mg → do not push b/c risk of side effects
  - Eg. prochlorperazine 5 to 10 mg
- **Reglan:** not as effective and have side effects which are 20x more common in kids than adults
  - 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
  - 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:
  - 0 risk factor → don’t have to do anything
  - 1 risk factor → 4mg dexamethasone ± second antiemetic at end of case
  - 2 risk factors → avoid volatile anesthetics, 4mg dexamethasone ± second antiemetic at end of case
  - 3 risk factors → avoid volatile anesthetics, 4mg dexamethasone, AND second antiemetic at end of case
  - 4 risk factors → 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:
  - Female
  - Age < 59
  - History of PONV
  - Received opioids in PACU
  - Nausea w/o vomiting in PACU
- Risk stratification:
  - No risk factor = 7% risk
  - 1 risk factor = 20% risk
  - 2 risk factors = 28% risk
  - 3 risk factors = 53% risk
  - 4 risk factors = 60% risk
  - 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 → prolong QT interval
  - Newest 5HT3 antagonist, Palonosetron, does not prolong QT; has ½ life 40 hours
- Treat extrapyramidal side effects with Benadryl, Benztropine 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


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/ACCRAC to become a patron and support the making of the show, or donate to paypal.me/ACCRAC
Notes by April Liu