

**UAB** THE UNIVERSITY OF  
ALABAMA AT BIRMINGHAM.

# Updates on PONV & PDNV

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No disclosures related to this activity



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1. PONV
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3. Summary and conclusion



# PONV: A value-added achievement



Clinical effectiveness

The application of the best knowledge, derived from research, clinical experience, and patient preferences to achieve optimum processes and outcomes



Operational effectiveness

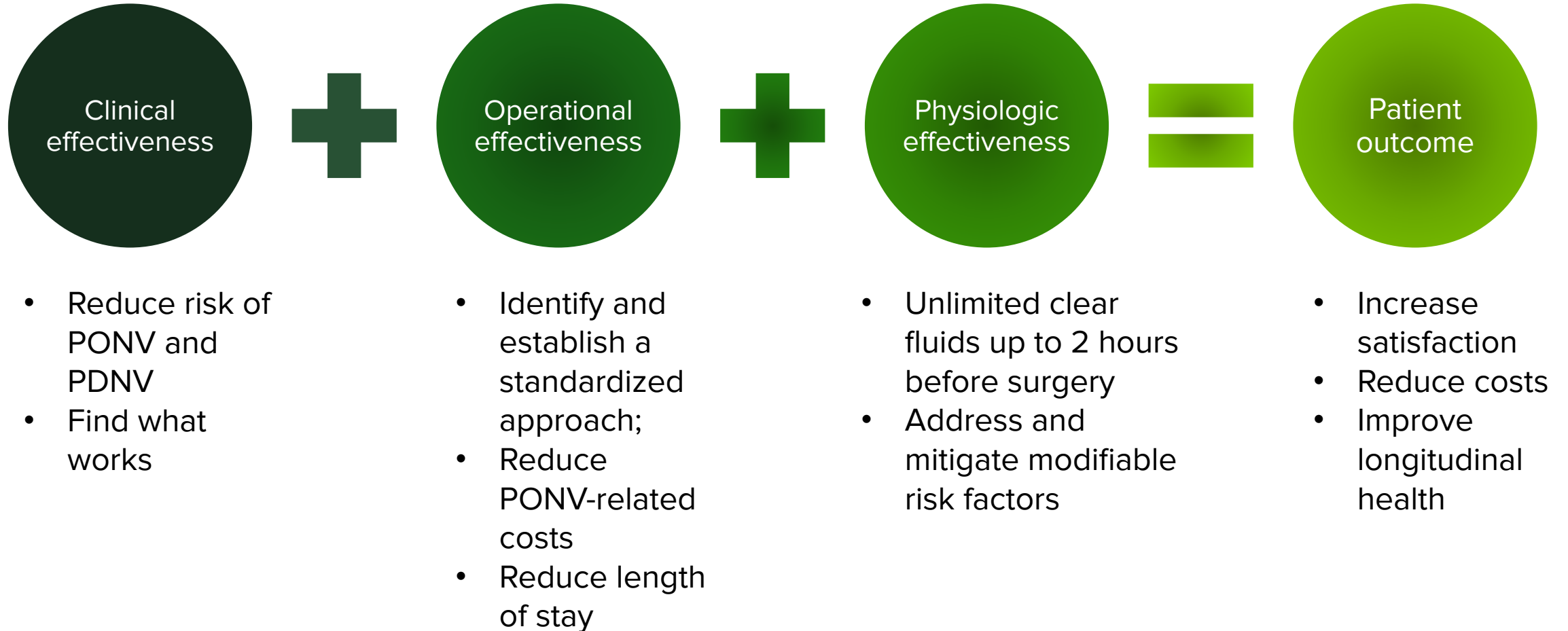
Any kind of practice which allows a business or other organization to maximize the use of their inputs by developing products at a faster pace than competitors or reducing defects



Physiologic effectiveness

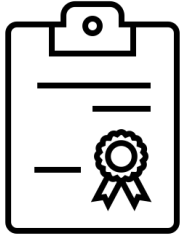
Improvement of body system functionality by prehabilitation and rehabilitation to increase the likelihood of successful perioperative outcomes and improve the health of the population

# PONV: What are we hoping to accomplish?

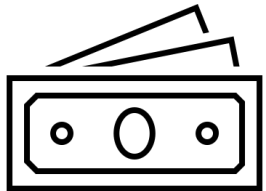


Adapted from: Arthur M. Boudreaux, MD. Used with permission

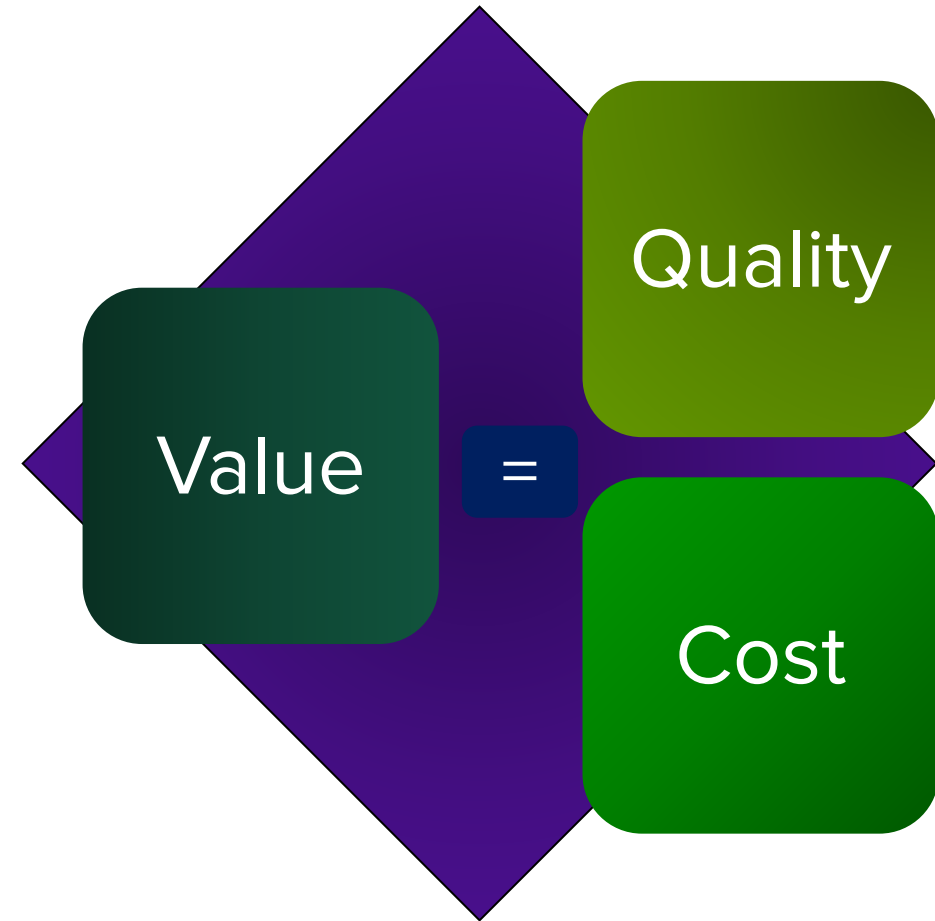
# The value of PONV management



- Patient
- Family
- Anesthesia care team
- Care-givers

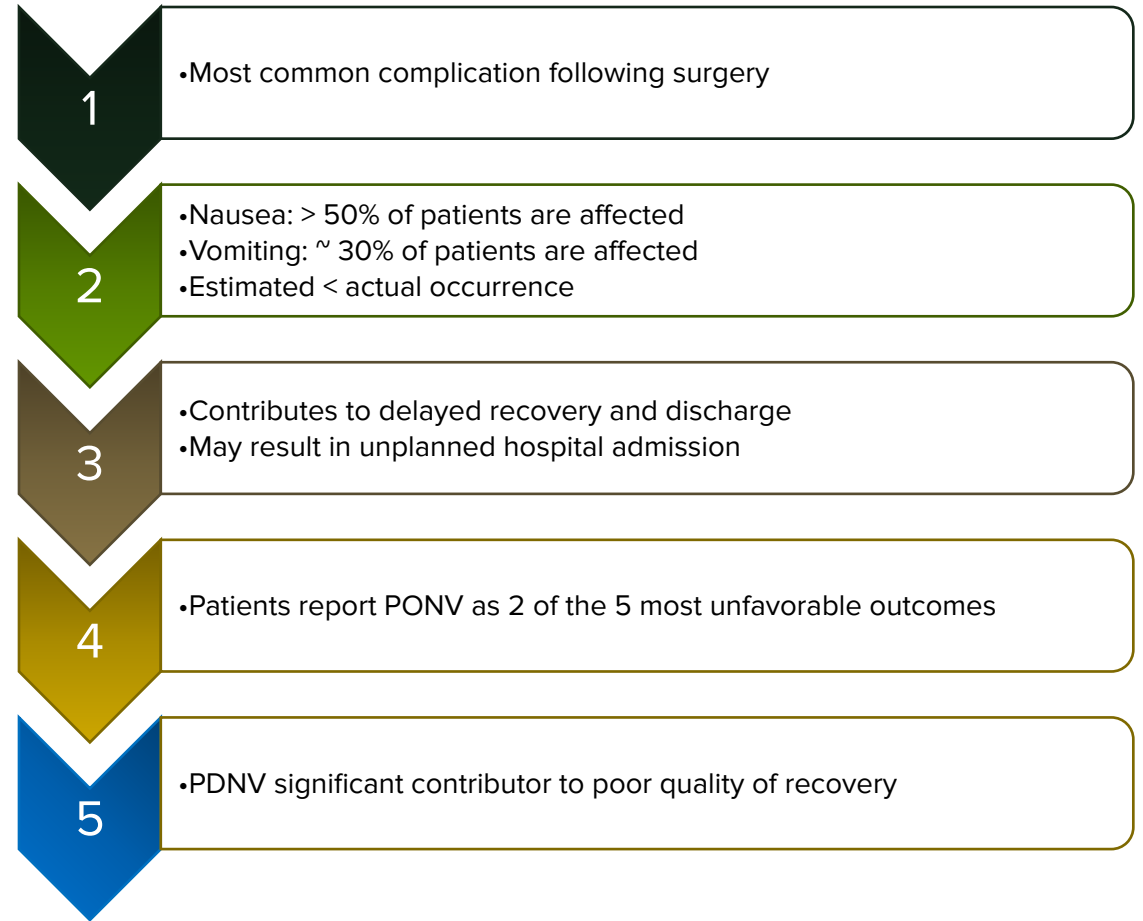


- Direct costs
  - Drug acquisition cost
  - Administration fee
  - Profit for healthcare institution
- Indirect costs
  - Time off work
  - Lost income
  - Lost productivity



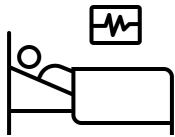
# PONV: *What we know...*

“Nausea and/or vomiting in patients within the first 24-hour period after surgery” often with the peak occurring in the immediate postoperative hours





# PONV: *risk factors*



## **Patient**

- Gender
- History of PONV
- History of motion sickness
- Age
- Smoking status



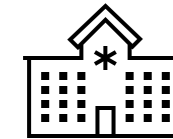
## **Surgery**

- Duration of surgery
- Procedural
  - Gynecology
  - Eye



## **Anesthesia**

- General versus regional
- Volatile versus TIVA
- Postoperative opioids
- Adjunctive therapy

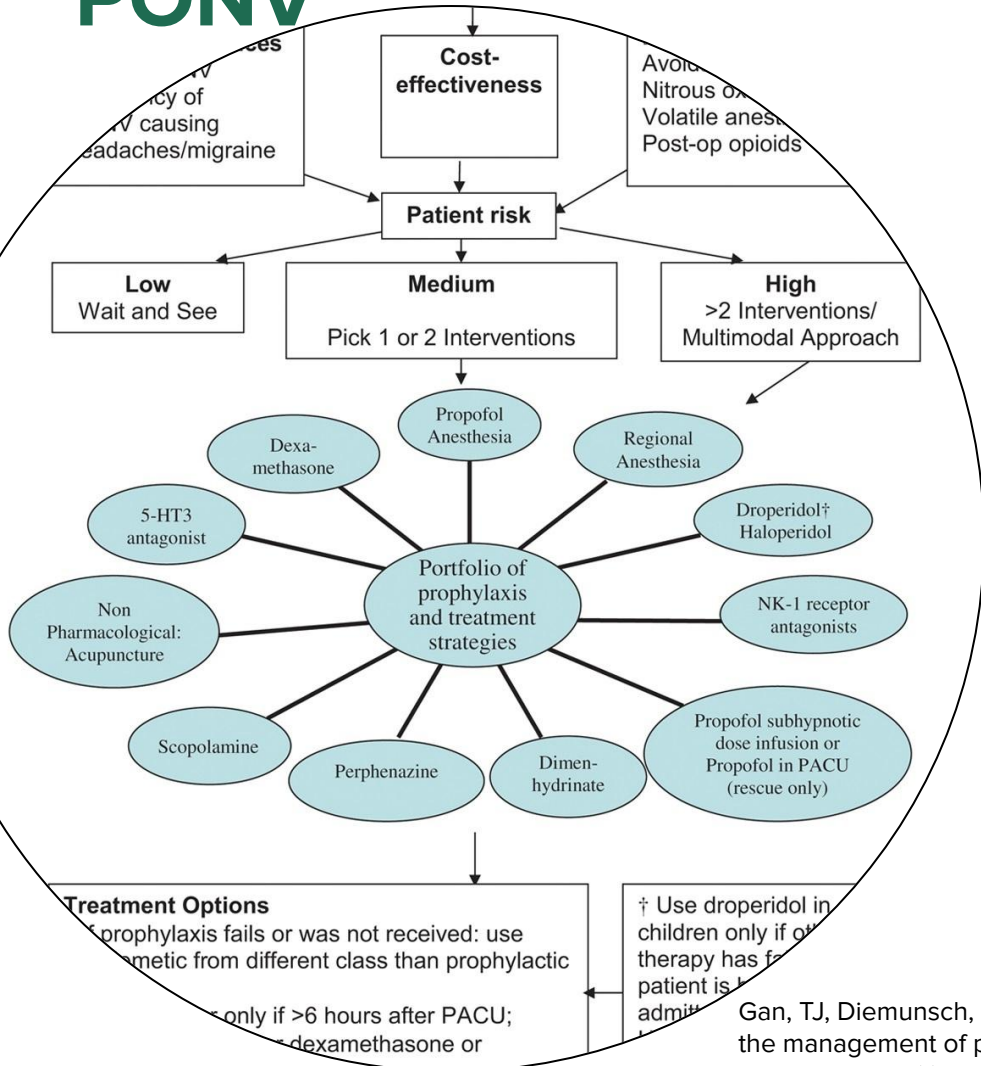


## **Postoperative**

- Postoperative opioids
- Nausea in PACU
- Pain control



# Pathophysiology of PONV



Gan, TJ, Diemunsch, P, Habib, AS, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesth Analg.* 2014;118(1):85-113.

## Trigger zones

- Area postrema
- Chemoreceptor trigger zone
- Vestibular system
- Limbic system
- Vagal inputs from GI tract

## Multiple receptors

- H1 and H2
- 5HT-3
- Dopaminergic
- Muscarinic
- Neurokinin-1
- Unknown

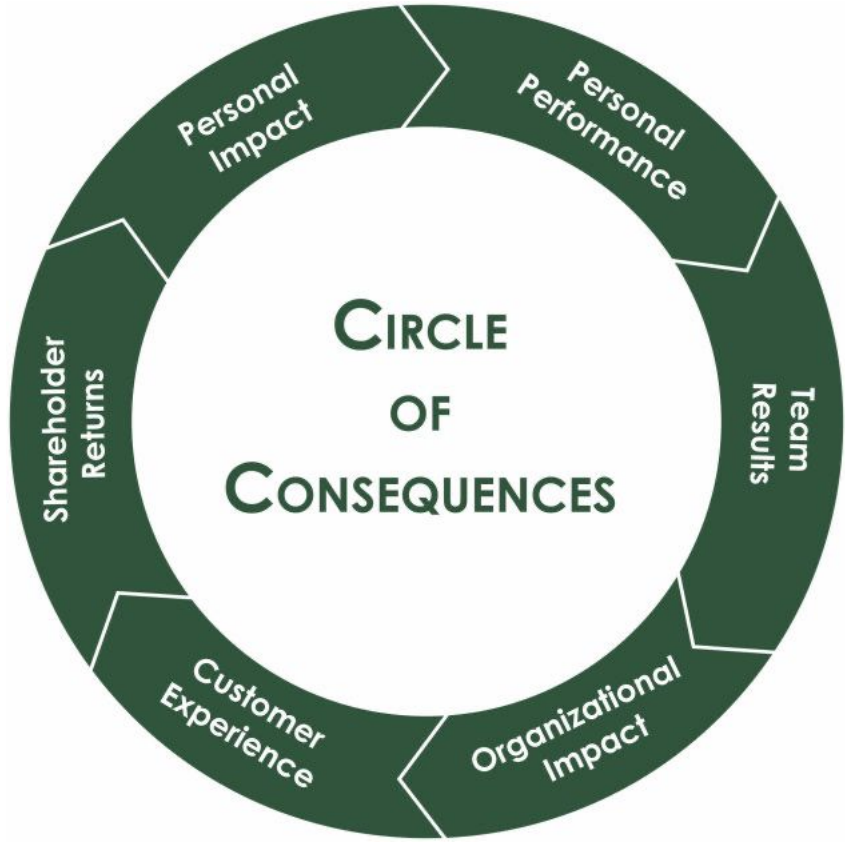
## Multiple medications

- Diphenhydramine  
Dimenhydrinate  
Ranitidine  
Famotidine
- Ondansetron
- Promethazine  
Metoclopramide  
Droperidol
- Scopolamine
- Aprepitant
- Dexamethasone

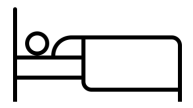
# PONV management strategy



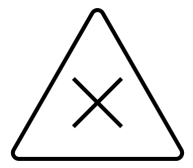
# Consequences and outcomes of PONV



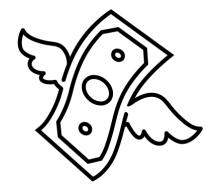
- Mild to severe discomfort



- Decreased ability for self-care
- Imposition on family and friends
- Lost work time/productivity



- Increased complications
- Wound dehiscence/bleeding
- Aspiration pneumonitis
- Dehydration/electrolyte imbalance

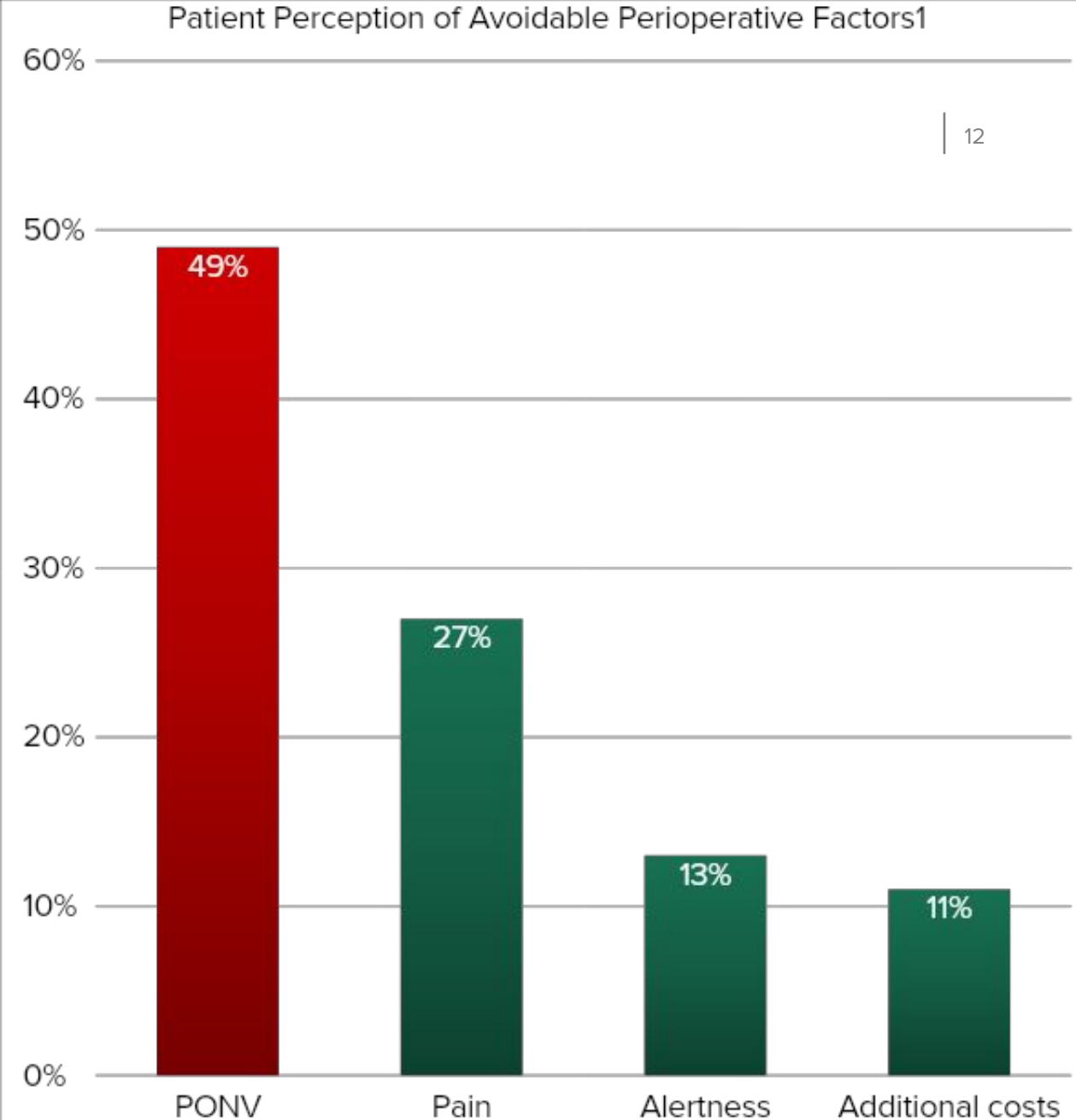


- Increased healthcare and facility costs
- Personnel, supplies, drugs
- Increased PACU length of stay
- Unplanned admission

# What do patients think?

- In several studies<sup>1,2,3</sup>:
  - Patients prioritize concern for PONV over enhanced pain relief
  - Need to balance opioid analgesia versus PONV

1. Eberhart LH, Morin AM, Wulf H, et al. *Br J Anaesth*. 2002;89(5):760-761.
2. Gan TJ, Lubarsky DA, Flood EM, et al. *Br J Anaesth*. 2004;92(5):681-688.
3. Macario, A, Weinger, M, Carney, S, Kim, A. *Anesth Analg*. 1999;89:652-658.

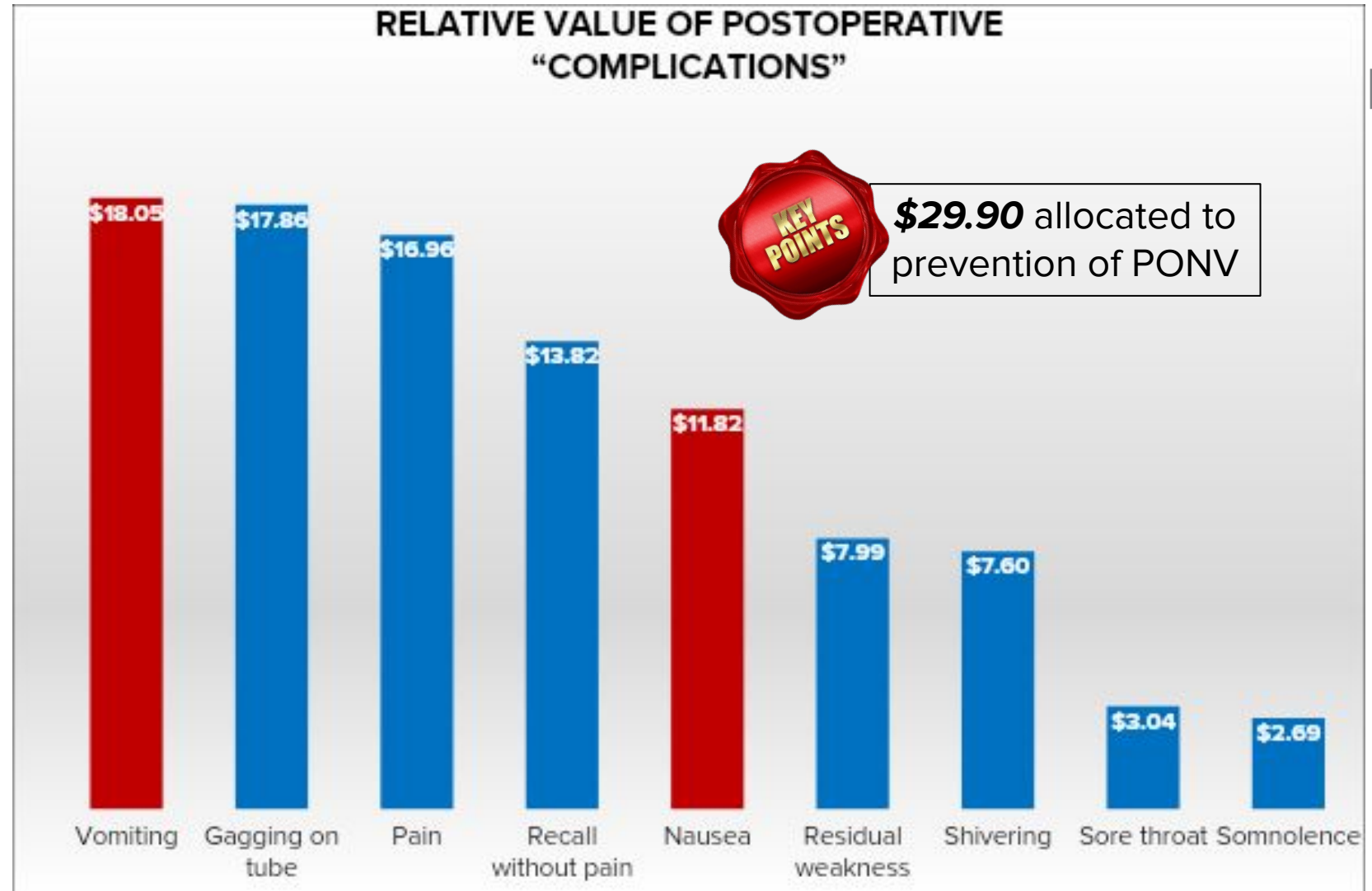


# What do patients think?

## Few thing to note:

- Fascinating that patients would rather have postoperative residual paralysis than PONV
- PONV is the patient's primary concern, not pain

## RELATIVE VALUE OF POSTOPERATIVE "COMPLICATIONS"

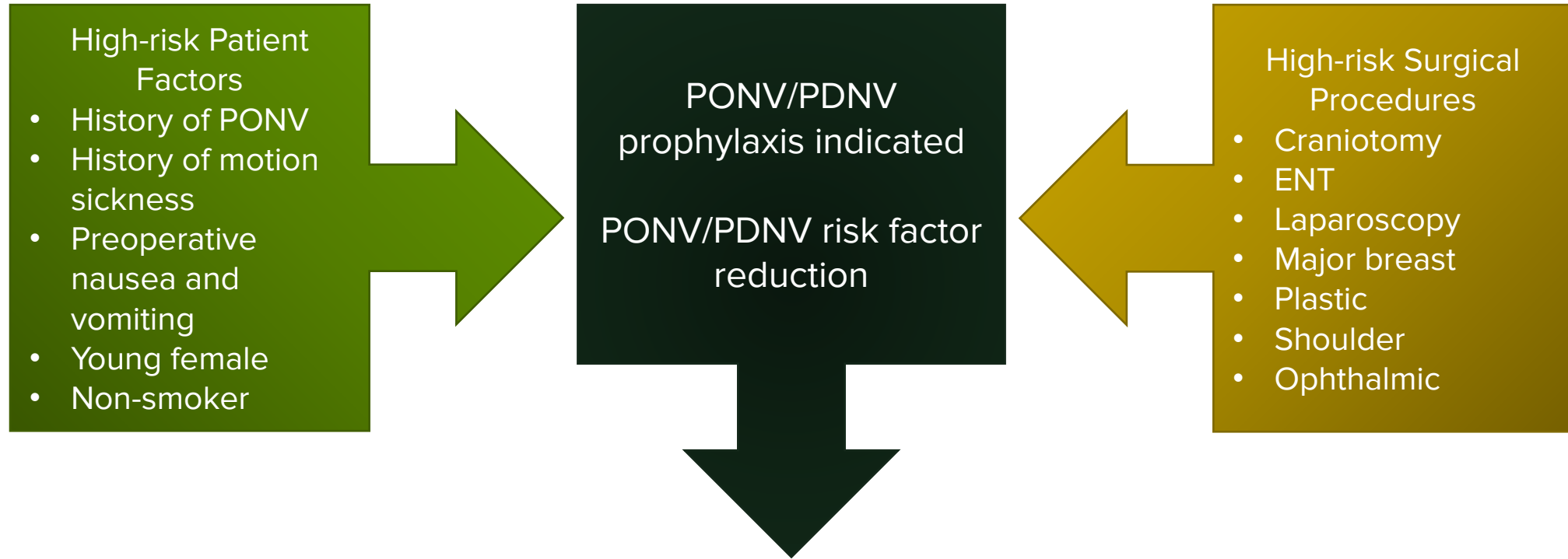


Macario, A, Weinger, M, Carney, S, Kim, A. Which clinical anesthesia outcomes are important to avoid? The perspective of patients. *Anesth Analg.* 1999;89:652-658.

Patients were asked to distribute \$100 among 10 outcomes, with proportionally more money being allocated to the more undesirable outcomes

# PONV

## *Risk stratification*



- High-risk Patient Factors
- History of PONV
  - History of motion sickness
  - Preoperative nausea and vomiting
  - Young female
  - Non-smoker

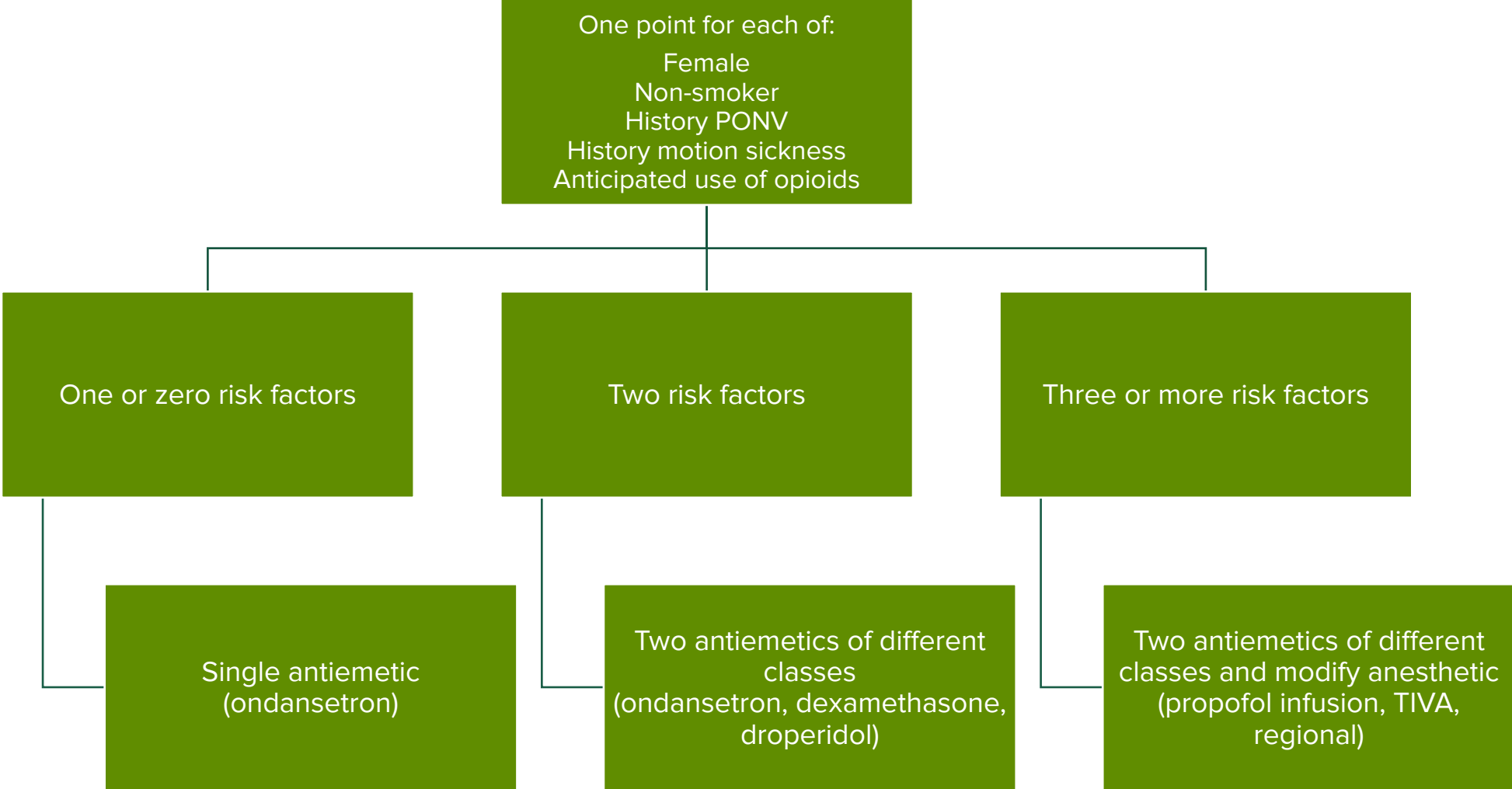
PONV/PDNU prophylaxis indicated

PONV/PDNU risk factor reduction

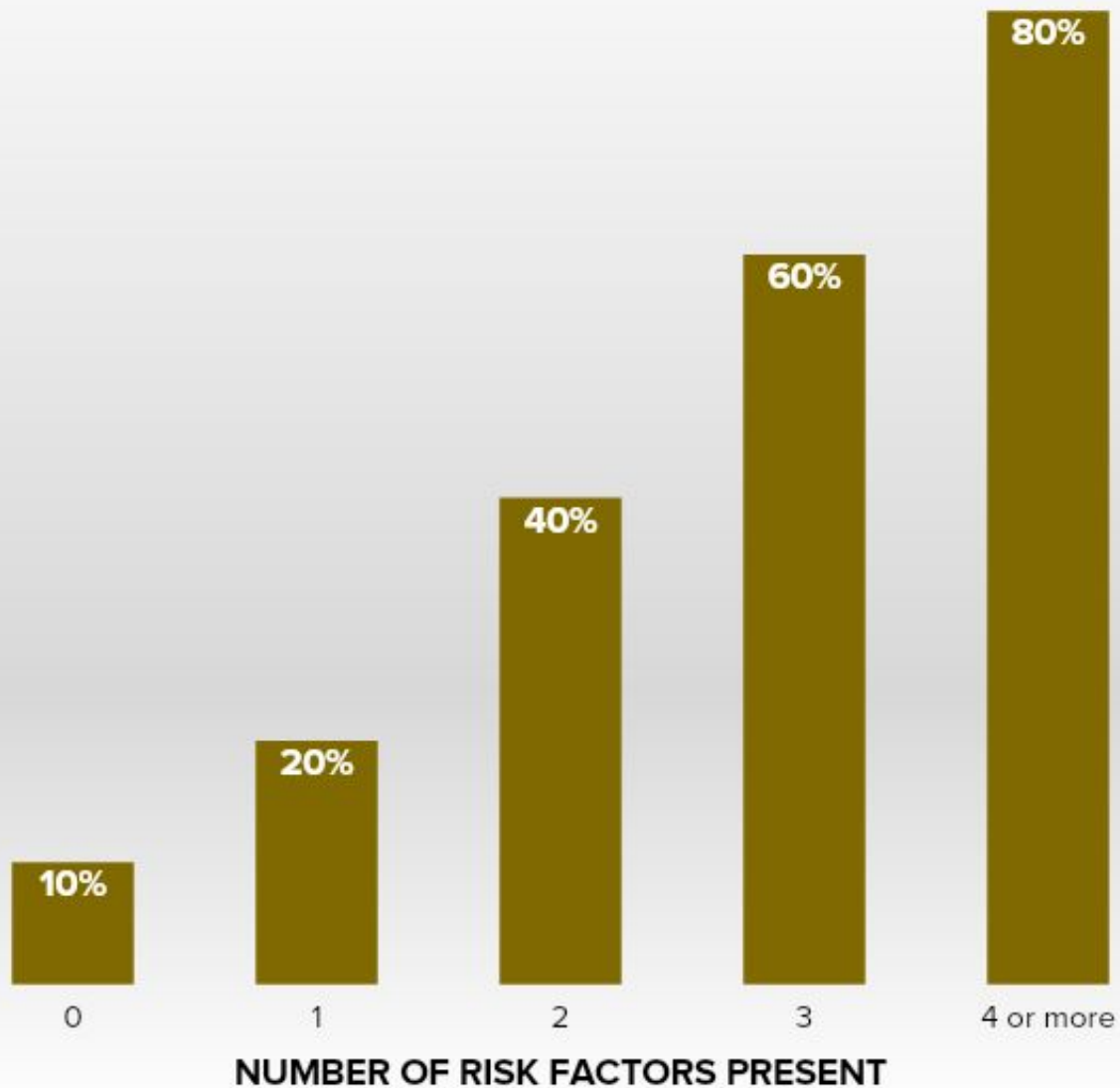
- High-risk Surgical Procedures
- Craniotomy
  - ENT
  - Laparoscopy
  - Major breast
  - Plastic
  - Shoulder
  - Ophthalmic

- |                                    |                                |
|------------------------------------|--------------------------------|
| Avoid general anesthesia           | Avoid nitrous oxide            |
| Avoid volatiles anesthetic agents  | Minimize perioperative opioids |
| Utilize propofol infusion or bolus | Provide adequate hydration     |

# Risk-stratify all patients presenting for anesthesia



INCIDENCE OF PONV BY  
NUMBER OF RISK FACTORS



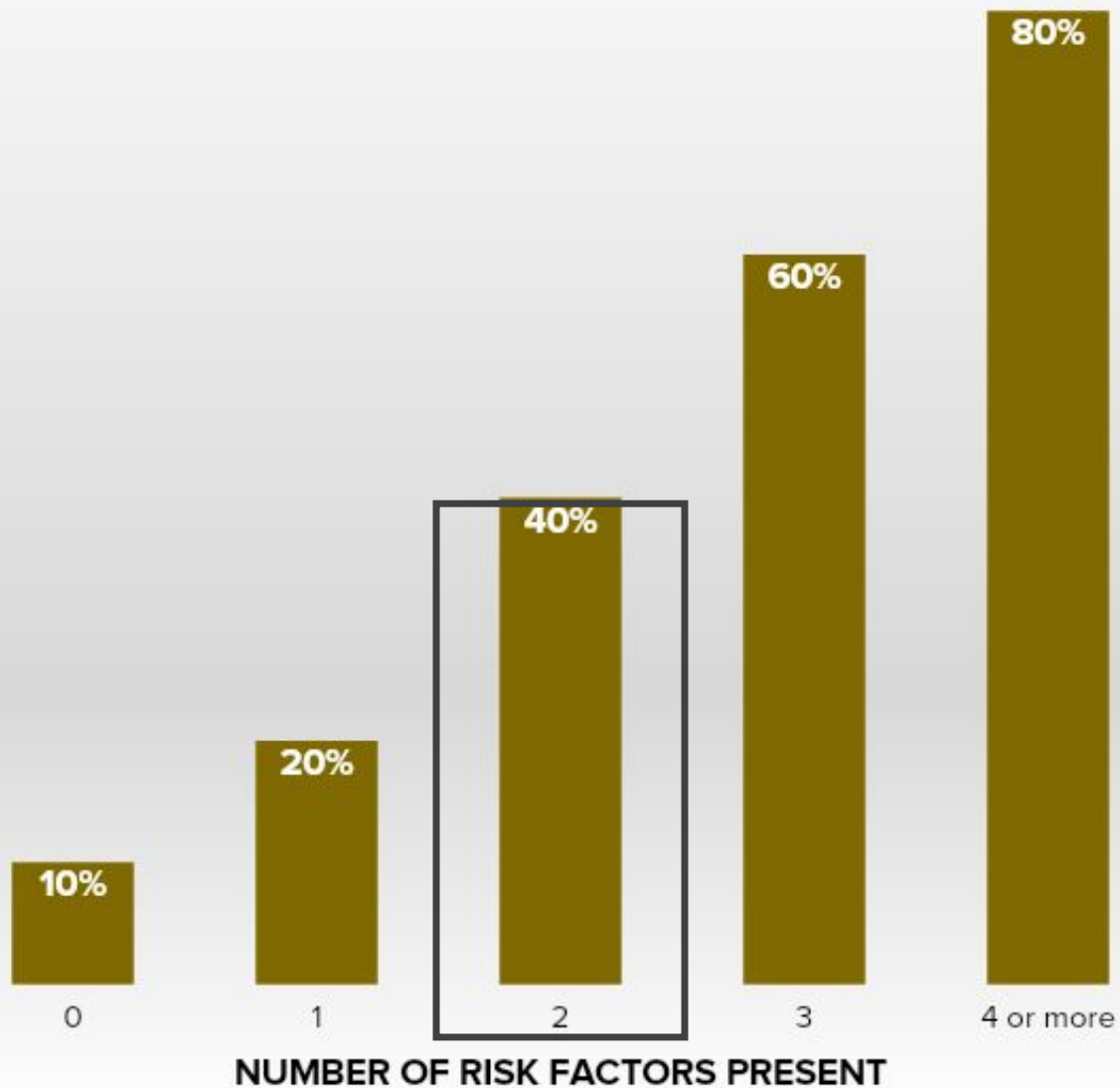
## PONV *Risk stratification*

- Overall incidence: *varies by number of risk factors*, but generally ~ 30%
- Female gender
- History of PONV
- Non-smoking status
- History of motion sickness
- Intended use of postoperative opioids

*Redisplayed from:* Gan, TJ, Diemunsch, P, Habib, AS, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesth Analg.* 2014;118(1):85-113.



INCIDENCE OF PONV BY  
NUMBER OF RISK FACTORS



## Risk stratification: what does this mean?

- Overall incidence: *varies by number of risk factors*, but generally ~ 30%

- Female gender
- Non-smoking status

- History of PONV
- History of motion sickness
- Intended use of postoperative opioids

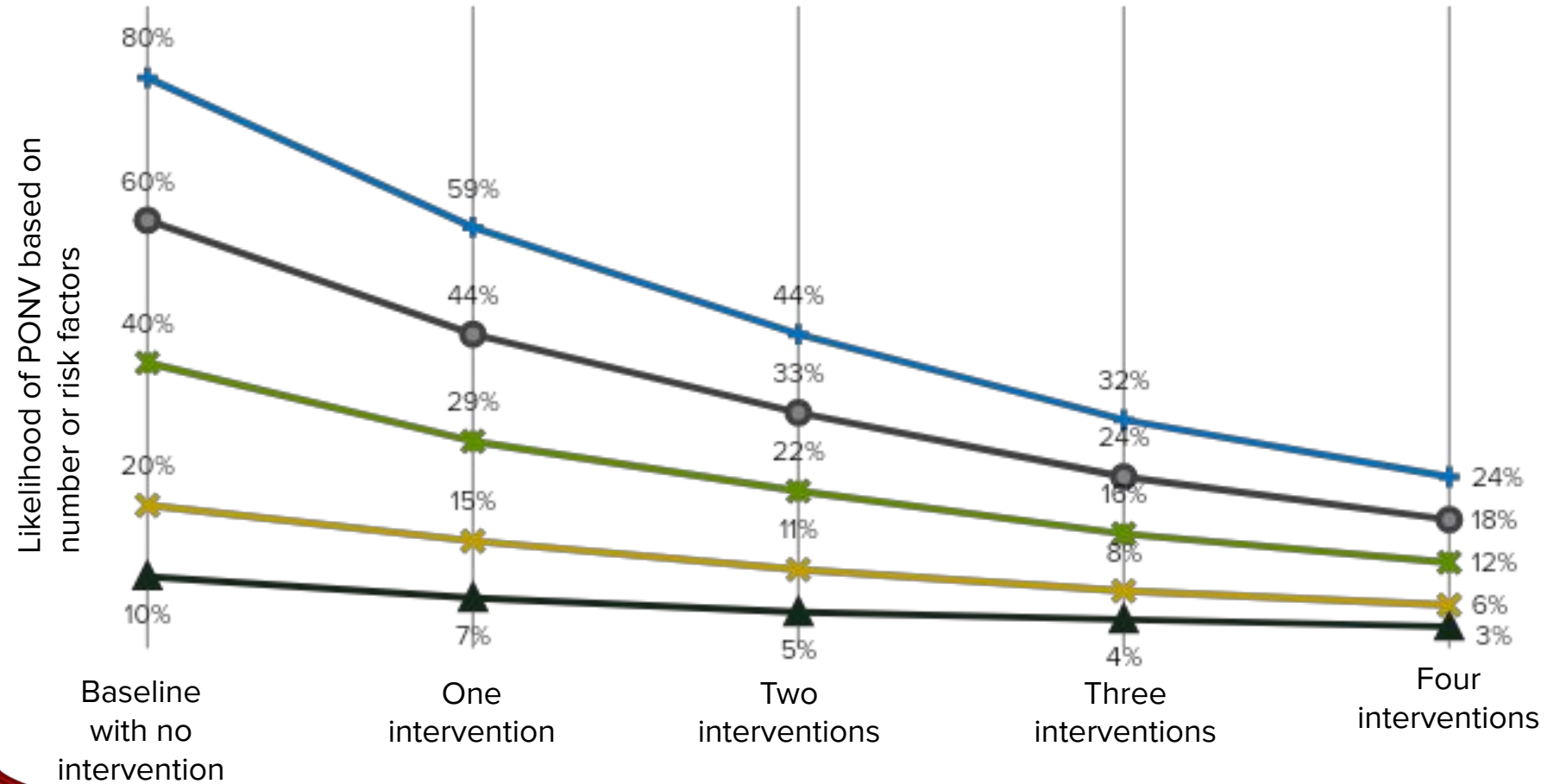
***Any non-smoking female starts with a PONV risk of 40%***

Redisplayed from: Gan, TJ, Diemunsch, P, Habib, AS, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesth Analg.* 2014;118(1):85-113.

# Effect of intervention



## Effect of PONV intervention



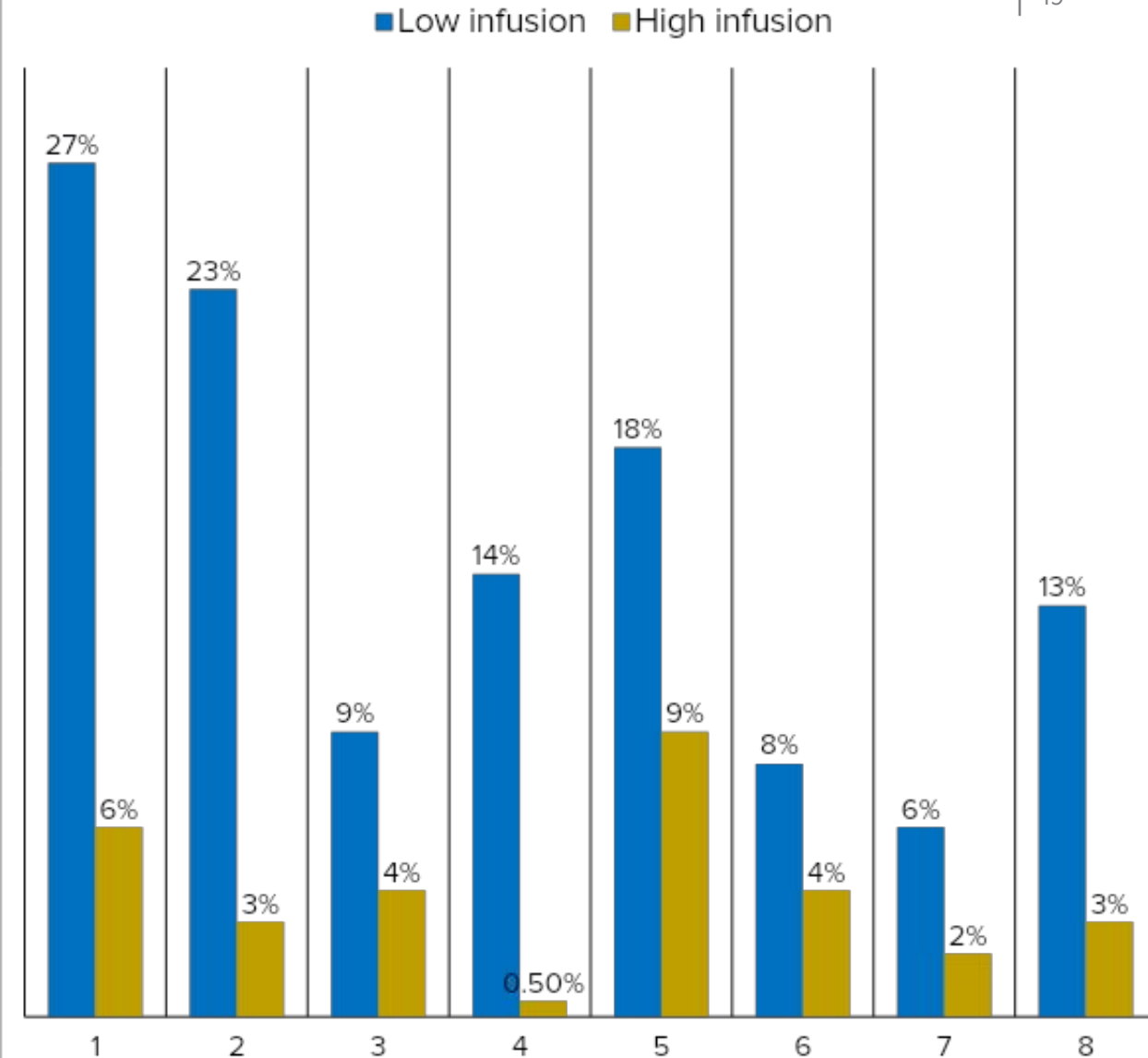
26% reduction in relative risk of PONV for each additional antiemetic intervention

Redisplayed from: Apfel, CC, Korttila, K, Abdalla, M, et al. A factorial trial of six interventions for the prevention of postoperative nausea and vomiting. *NEJM*. 2004;350(24):2441-2451.

## Effect of fluid

- Liberal fluid strategies demonstrate benefit of reducing PONV and PDNV in ambulatory patients
- We now know that liberal fluid is detrimental in thoracic and abdominal surgeries

## Incidence of nausea with Fluid administration

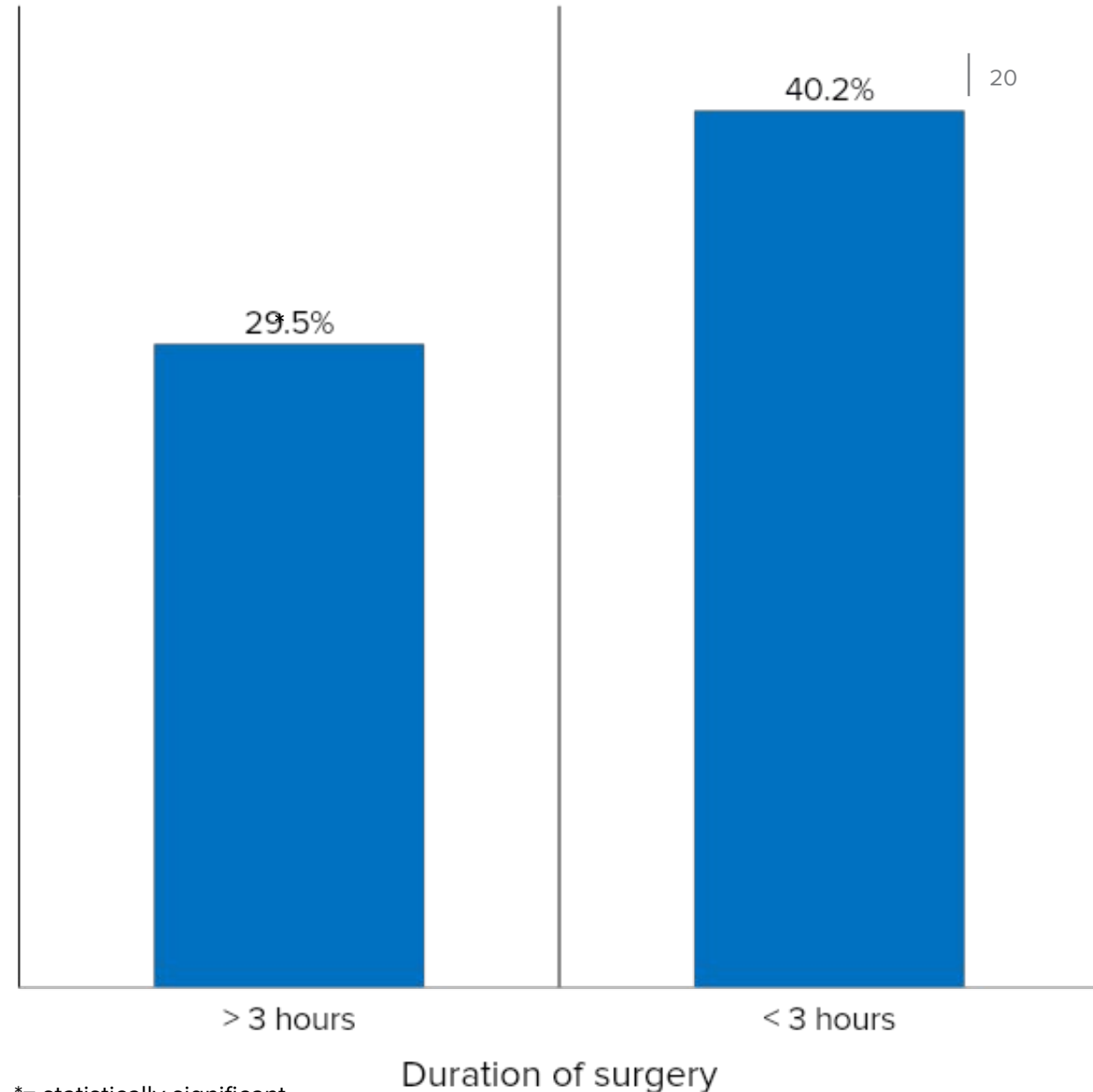


## In RE: Colloid v. Crystalloid

- *Colloid infusions showed protective effect against PONV in abdominal surgeries lasting 3 hours or longer*
- Little difference in anti-emetic requirements between groups
- Little difference for surgeries under 3 hours

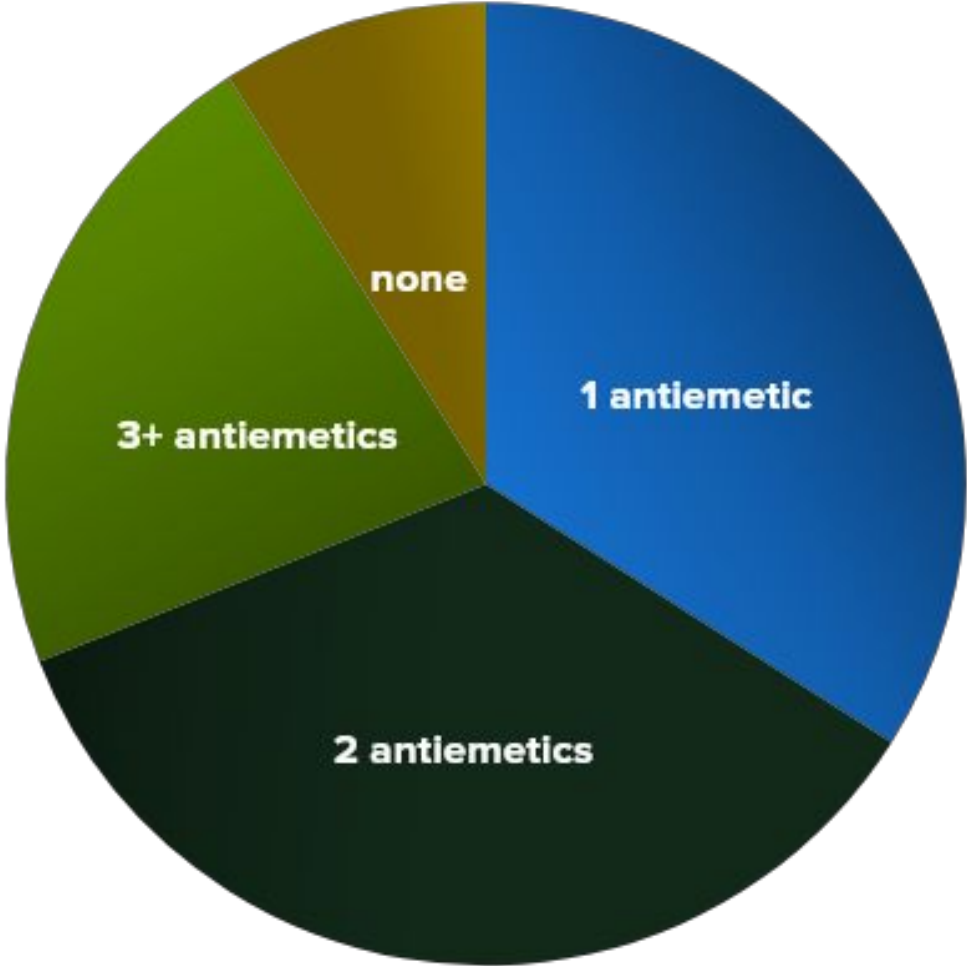
Kim, HJ, Choi, SH, Eum, D, et al. Is perioperative colloid infusion more effective than crystalloid in preventing postoperative nausea and vomiting? A systematic review and meta-analysis. *Medicine*. 2019;98(7):e14339.

### Colloid vs. crystalloid on ponv incidence



# PONV: *How are we doing?*

- **The good news:**
  - 91% of patients received prophylactic antiemetics
- **The bad news:**
  - Wide and unacceptable variation among providers in treatment of high-risk patients keeps PDNV rates high
    - 30% still had PDNV
    - 45% required rescue medications within 72 hours of surgery



White, PF, O'Hara, JF, Roberson, CR, et al. The impact of current antiemetic practices on patient outcomes: A prospective study on high-risk patients. *Anesth Analg.* 2008;107(2):452-458.

# PONV: *Patterns of antiemetic use*

- 9% gave no antiemetic
- The remainder are a real witches brew:
  - Single agent: 34%
    - 5-HT<sub>3</sub> (26%), metoclopramide (5%), dexamethasone (3%), droperidol (1%)
  - Two-drug combinations: 35%
    - 5-HT<sub>3</sub> with dexamethasone (22%), 5-HT<sub>3</sub> with droperidol (1%), 5-HT<sub>3</sub> with something else (9%)
  - Multi-drug combinations: 22%
    - 5-HT<sub>3</sub> with dexamethasone and droperidol (8%)
    - 5-HT<sub>3</sub> with dexamethasone and something else (10%)
    - Something else entirely (< 4%)



White, PF, O'Hara, JF, Roberson, CR, et al. The impact of current antiemetic practices on patient outcomes: A prospective study on high-risk patients. *Anesth Analg.* 2008;107(2):452-458.

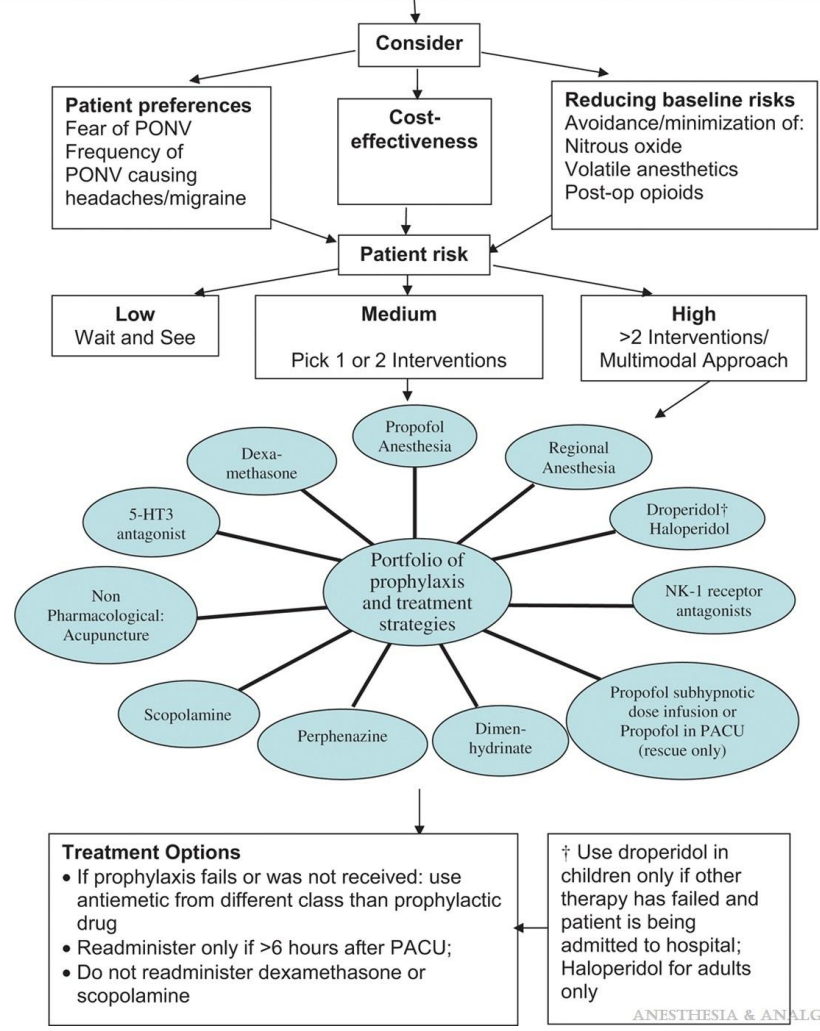
# PONV Patterns of management

- One approach does not work for everybody
- Repeating the same medication within the first 6 hours confers no additional benefit
- Theoretical benefit after 6 hours, but not demonstrated in clinical trials
- Re-administration of long-acting agents not recommended



If one approach fails, try something else

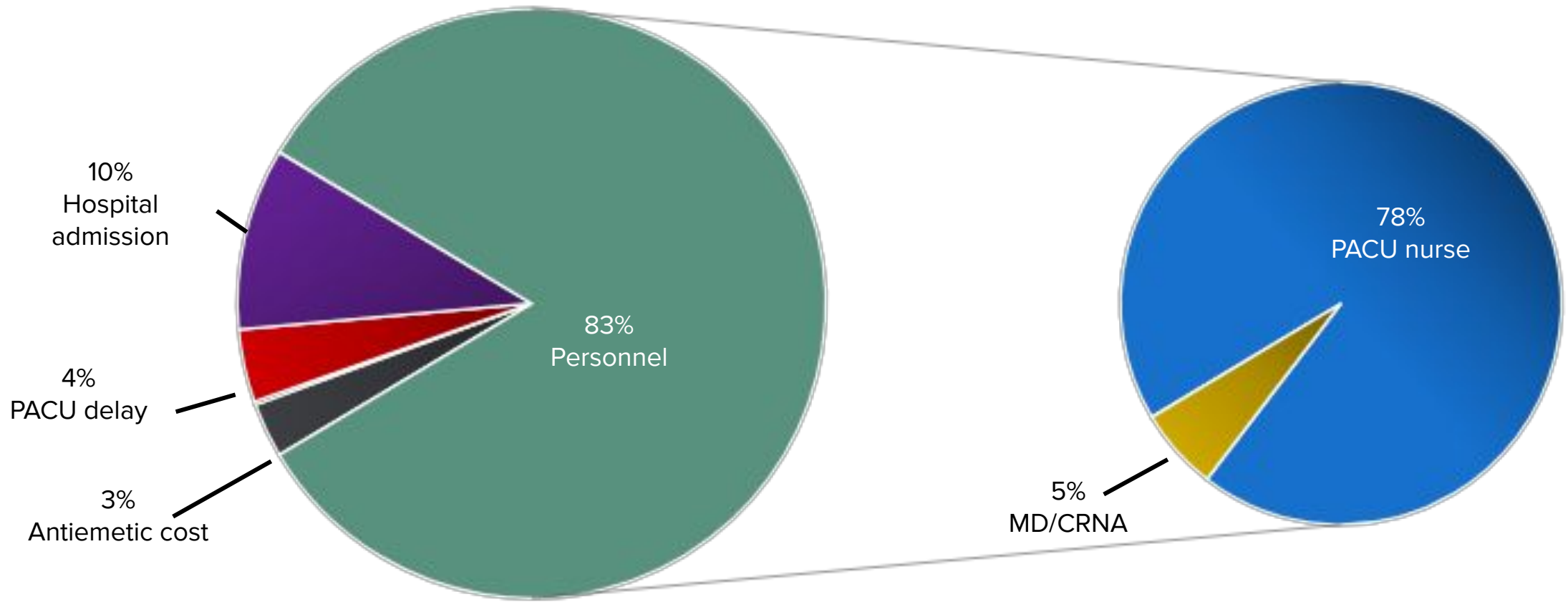
Adult Risk Factors		Children Risk Factors
Patient Related	Environmental	Surgery > 30 min
History of PONV/motion sickness	Postop opioids	Age > 3 years
Female gender	Emetogenic surgery (type and duration)	Strabismus surgery
Non-smoker		History of POV/relative with PONV



Gan, TJ, Diemunsch, P, Habib, AS, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesth Analg*. 2014;118(1):85-113.

# What does it cost to throw up?

**COST COMPONENTS FOR AN EPISODE OF EMESIS**  
% total median management cost per patient



Hill, RP, Lubarsky, DA, Phillips-Bute, B, et al. Cost-effectiveness of prophylactic antiemetic therapy with ondansetron, droperidol, or placebo. *Anesthesiology*. 2000;92:958-967.



# PONV incurs higher healthcare costs

- In a study conducted in 2000, PONV is associated with increased costs\*
  - A single episode of **emesis costs** an average of **\$138-305**
  - A single episode of **nausea costs** an average of **\$82-85**
- PONV is a major factor limiting early discharge of ambulatory surgical patients
- PONV is a leading cause of unanticipated hospital admissions
  - 24% primary reason
- Preventing PONV can be cost-effective



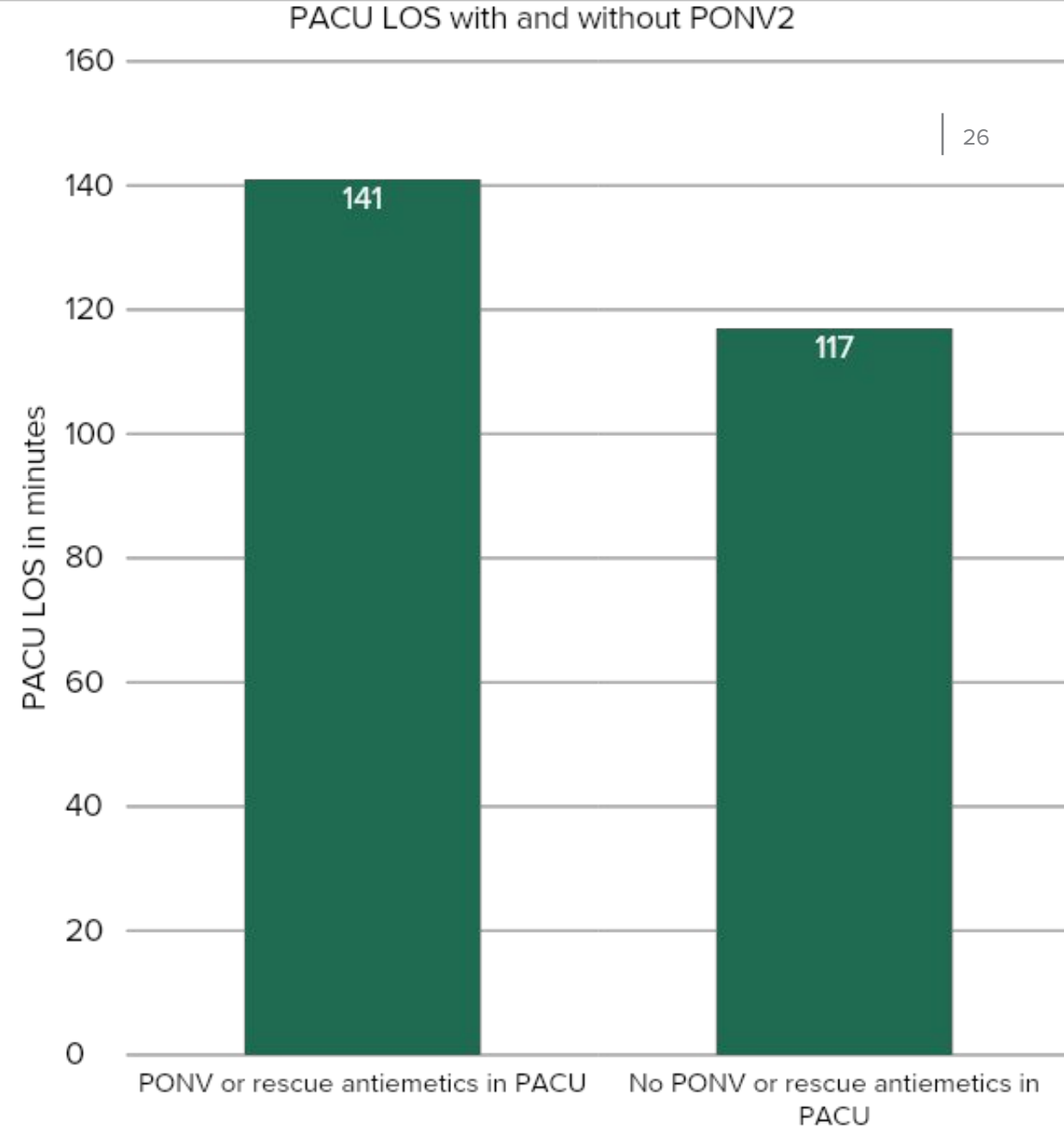
\* PACU personnel costs are the largest component  
***Not pharmaceuticals***

Hill, RP, Lubarsky, DA, Phillips-Bute, B, et al. Cost-effectiveness of prophylactic antiemetic therapy with ondansetron, droperidol, or placebo. *Anesthesiology*. 2000;92:958-967.

# PONV increases PACU length of stay

- Important facility considerations
  - Optimizing throughput
  - Reducing costs of care
- PONV produces a cascade effect
  - Unanticipated hospital admission
    - Average in-patient day charge: \$2338<sup>1</sup>
  - Reduces facility throughput
  - Reduces early discharge
  - Reduces efficiency

1. Kaiser Family Foundation. Hospital adjusted expenses per inpatient day. [www.kff.org/other/state-indicator/expenses-per-inpatient-day/](http://www.kff.org/other/state-indicator/expenses-per-inpatient-day/). Accessed March 6, 2019.
2. Habib AS, Chen YT, Taguchi A, et al. *Curr Med Res Opin.* 2006;22(6): 1093-1099



# Is it more cost effective to prevent PONV or just let patients throw up?

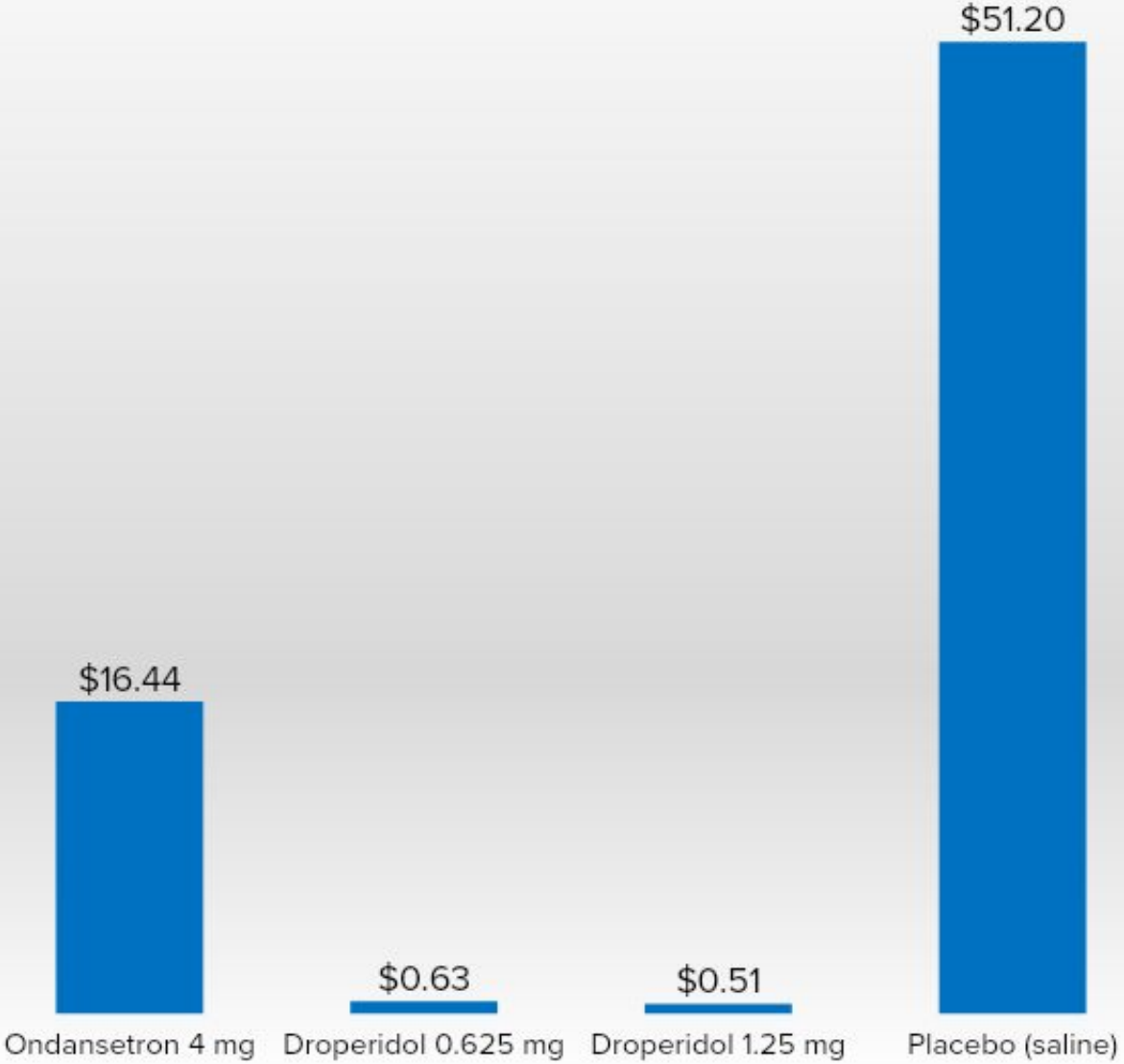
- Cost per patient includes:
  - Drug acquisition, materials, personnel time, PACU delay
  - Hospital admission adds even more

### Principal Conclusions

- Prophylactic antiemetics are cost-effective
- Associated increase in patient satisfaction

### Implications

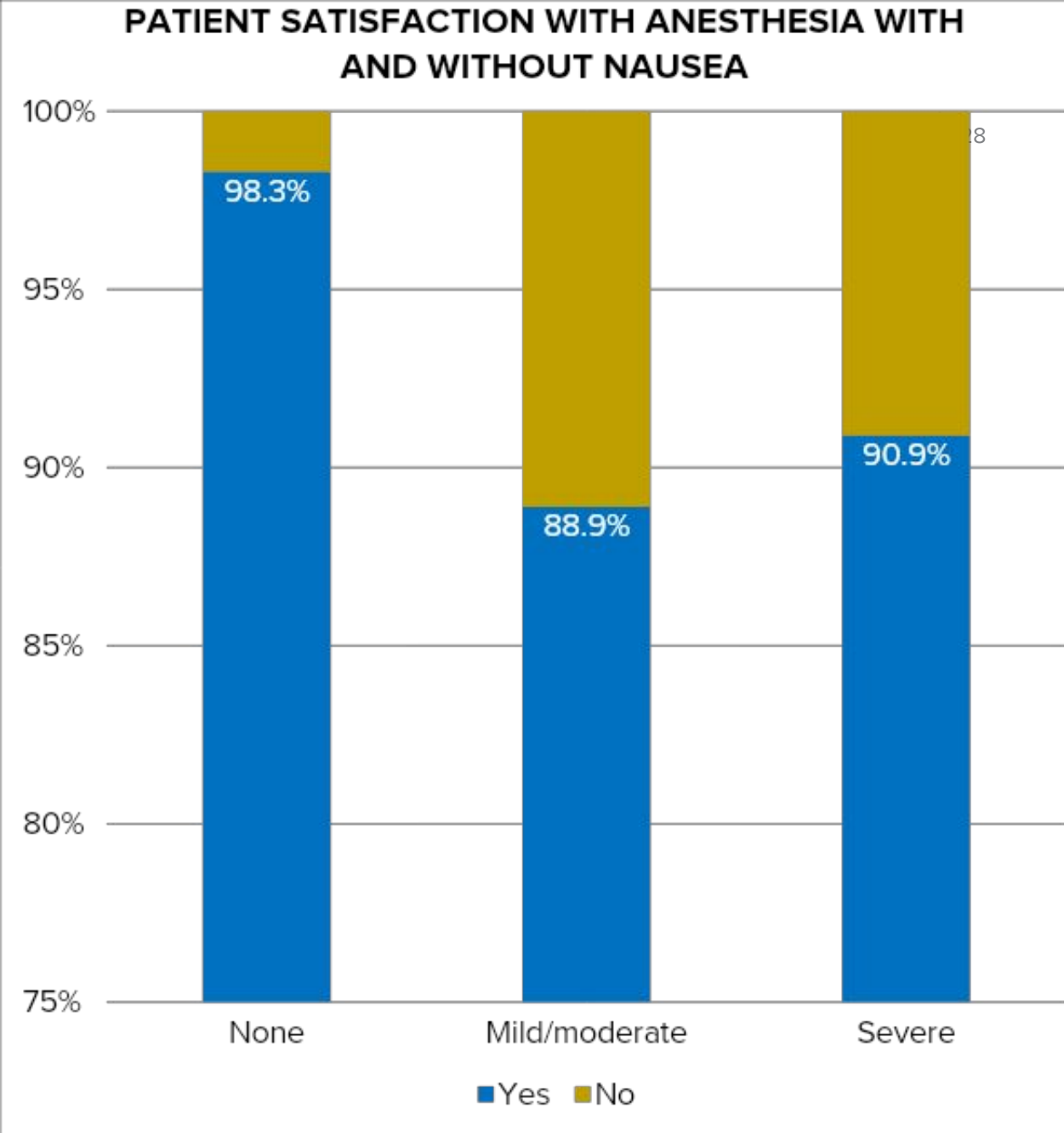
- Hospitals should value prophylaxis highly
- Costs decrease when high-risk patients receive prophylaxis
- Anesthesia teams should be aggressive with PONV prophylaxis



Hill, RP, Lubarsky, DA, Phillips-Bute, B, et al. Cost-effectiveness of prophylactic antiemetic therapy with ondansetron, droperidol, or placebo. *Anesthesiology*. 2000;92:958-967.

## PONV: *Patient satisfaction*

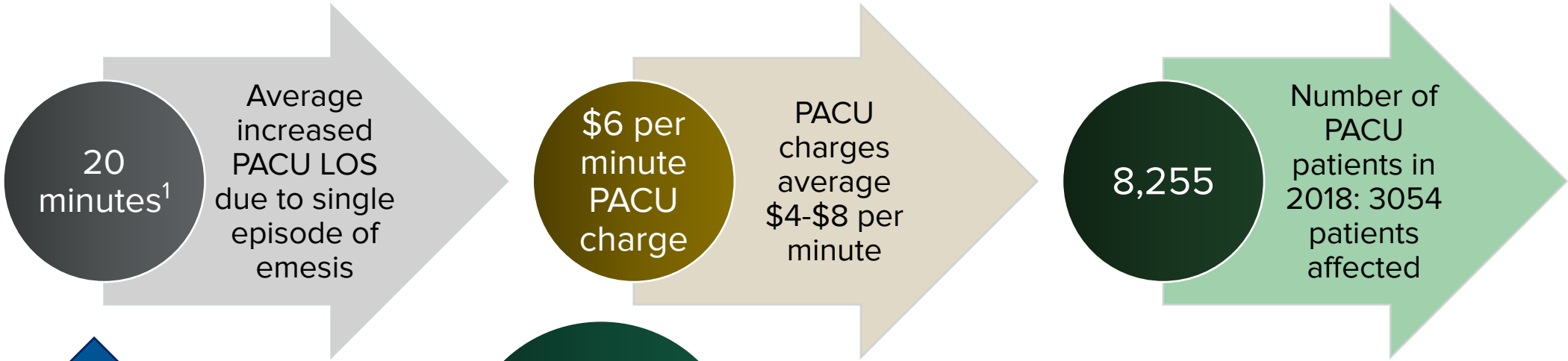
- Patient satisfaction **drops** by 10% if patients get nauseated
- Pain other large source of dissatisfaction



# PONV

## Cost of PONV

An estimated 37% of patients arriving to the PACU experience PONV



↑  
*...a clinically and statistically significant difference...*

\$366,480  
Amount of money to be saved by eliminating PONV

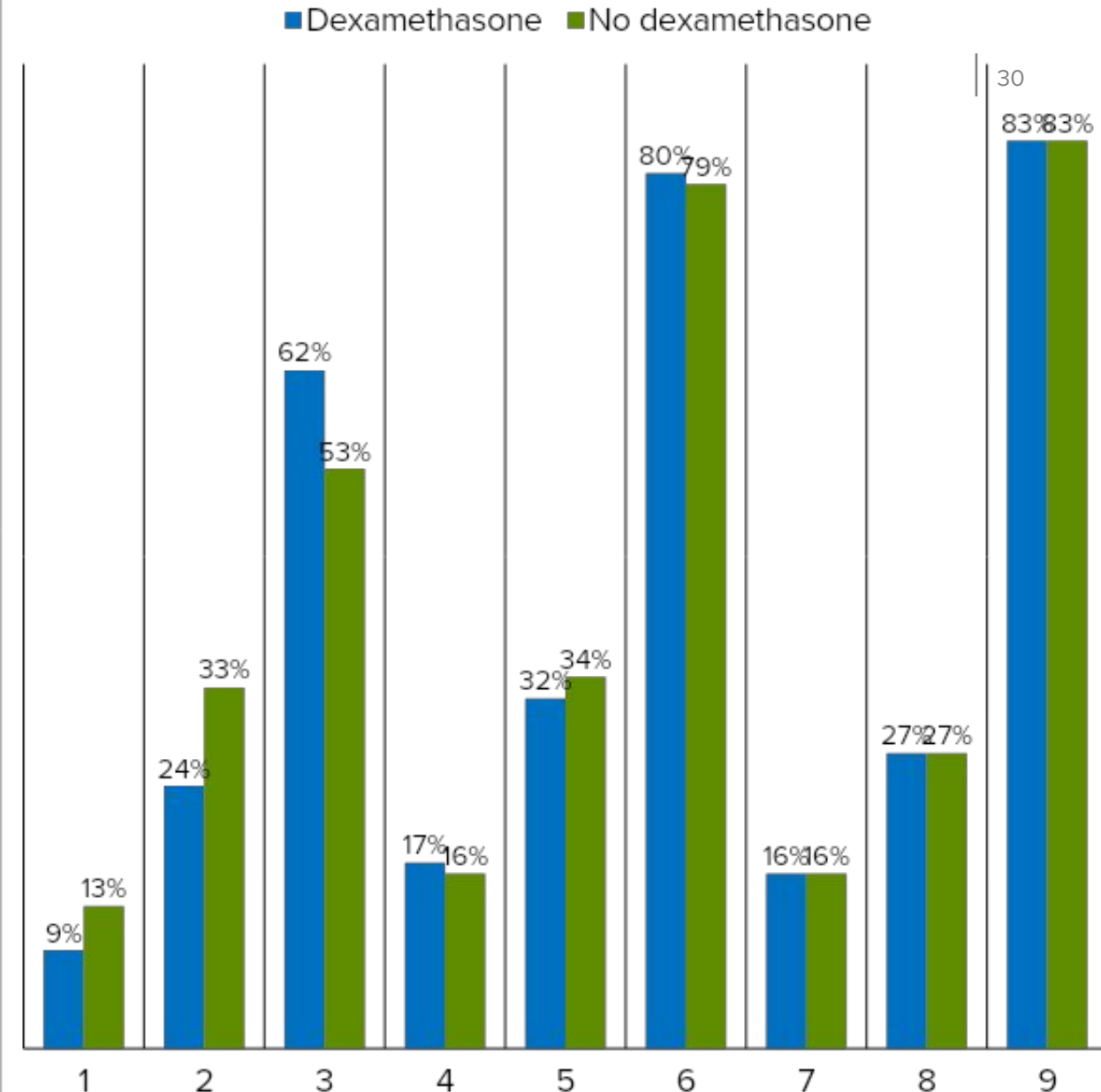


# What about dexamethasone?

Better quality of recovery scores (p<0.001) in patients receiving dexamethasone<sup>2</sup>

1. Resdisplayed from: Bartlett, D, Morton, DG, DREAMS collaborative group. Dexamethasone versus standard treatment for PONV in gastrointestinal surgery: randomized controlled trial (DREAMS Trial). *BMJ*. 2017;357:j1455.
2. Murphy GS, Sherwani SS, Szokol JW, et al. Small-dose dexamethasone improves quality of recovery scores after elective cardiac surgery: a randomized, double-blind, placebo-controlled study. *J Cardiothorac Vasc Anesth* 2011;25:950-60.

Patient reported outcomes +/- Dexamethasone<sup>1</sup>



# Dexamethasone and adverse outcomes at 30-days

## Principal conclusion:

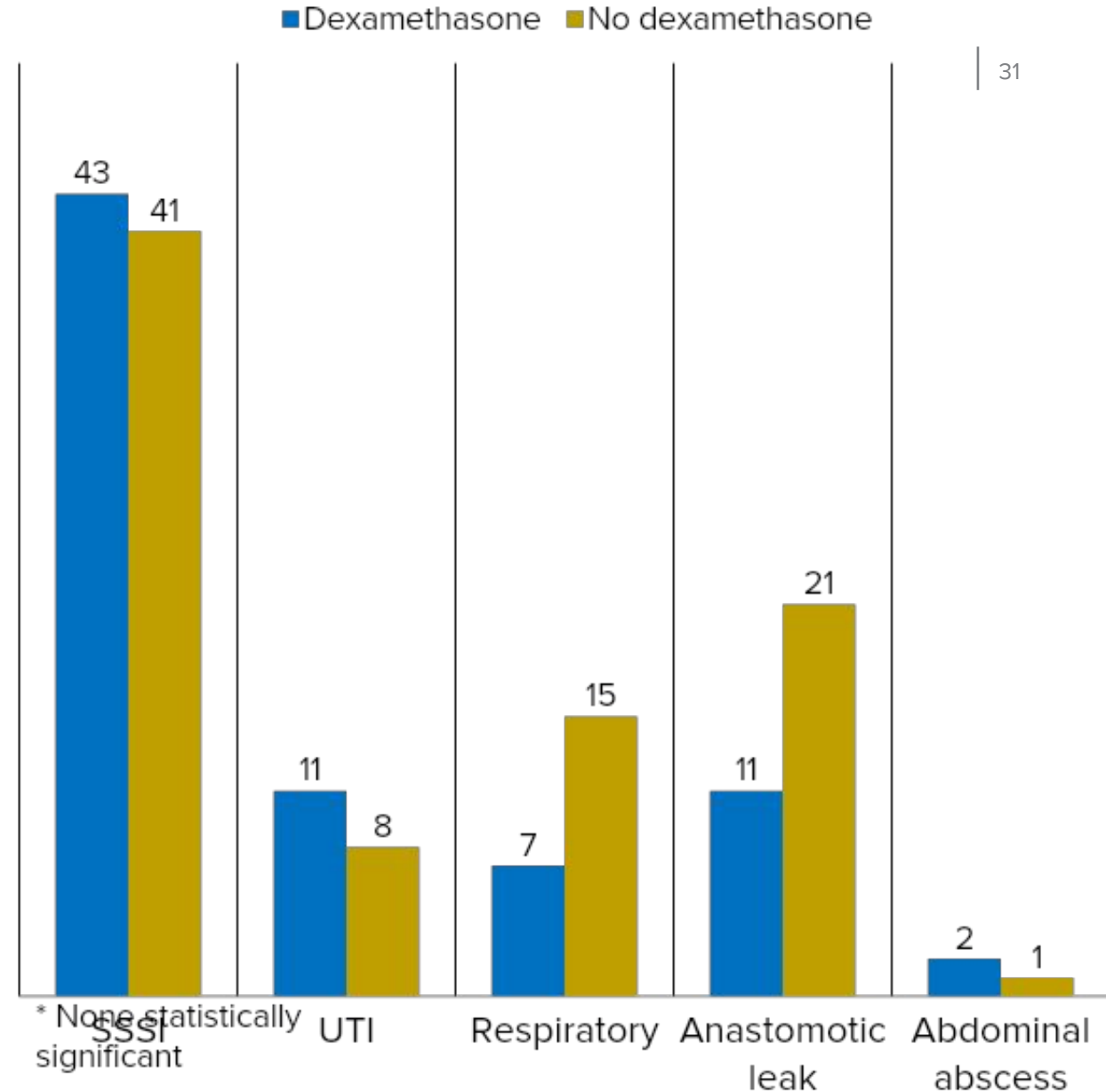
8 mg dexamethasone significantly reduces PONV at 24 hours, is safe to use, and should be routinely given<sup>1</sup>

## But...

- Diabetic patients excluded
- Other studies show dysglycemia in patients with preoperative impaired blood glucose<sup>2</sup>

1. Bartlett, D, Morton, DG, DREAMS collaborative group. Dexamethasone versus standard treatment for PONV in gastrointestinal surgery: randomized controlled trial (DREAMS Trial). *BMJ*. 2017;357:j1455.
2. Nazar CE, Lacassie HJ, López RA, Muñoz HR. Dexamethasone for postoperative nausea and vomiting prophylaxis: effect on glycaemia in obese patients with impaired glucose tolerance. *Eur J Anaesthesiol* 2009;26:318-21.

## 30-day outcomes +/- Dexamethasone



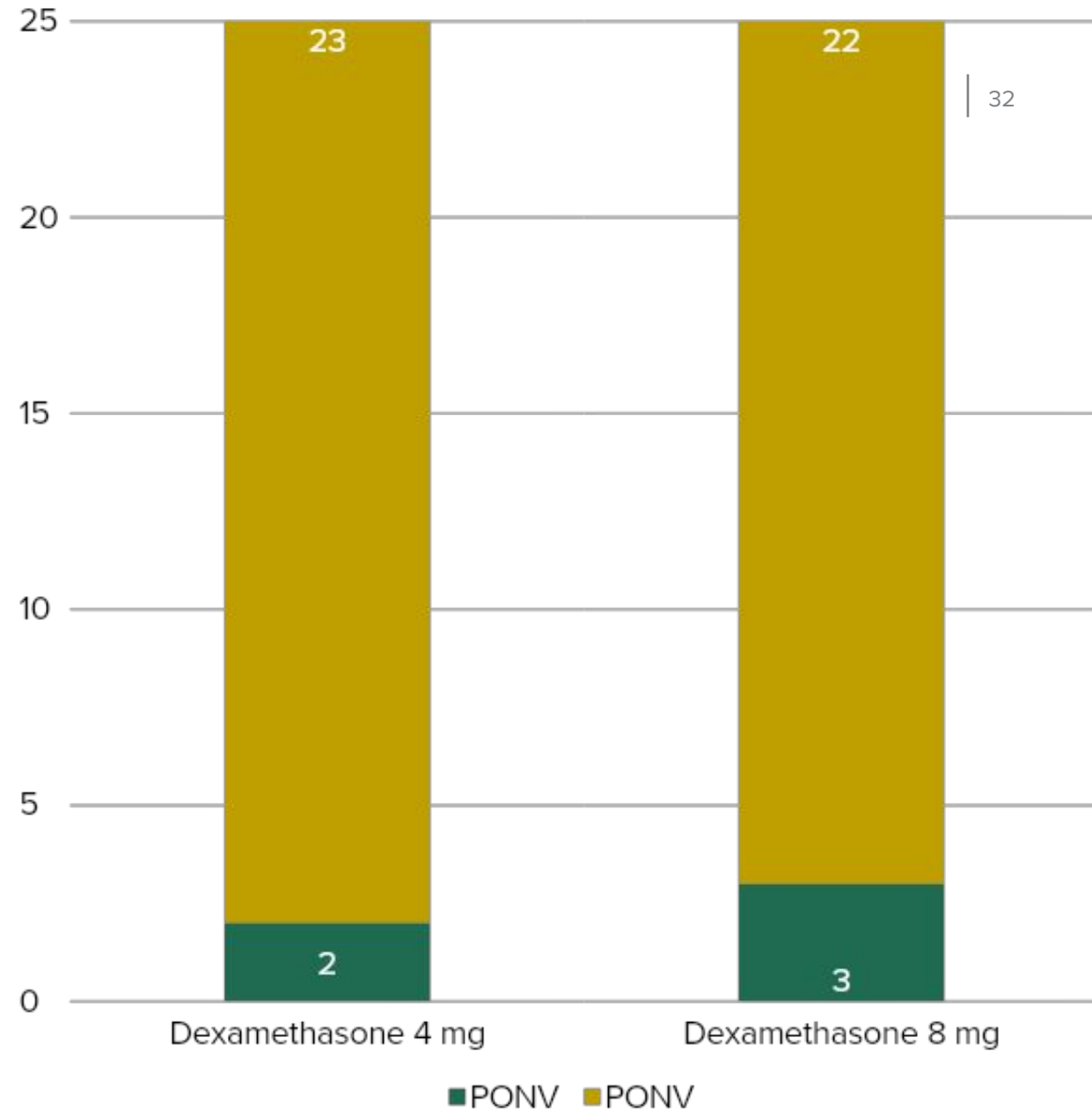
# Dexamethasone: does dose matter?



Dose doesn't matter

Doyle, Steven B., "Is Dexamethasone 4mg a More Effective Anti-Emetic than Dexamethasone 8mg for the Prevention of Early Post-Operative Nausea and Vomiting in Women Undergoing Laparoscopic Gynecological Surgery?" (2015). Doctoral Projects. 16. [https://aquila.usm.edu/dnp\\_capstone/16](https://aquila.usm.edu/dnp_capstone/16)

Does Dexamethasone dose matter in PONV?





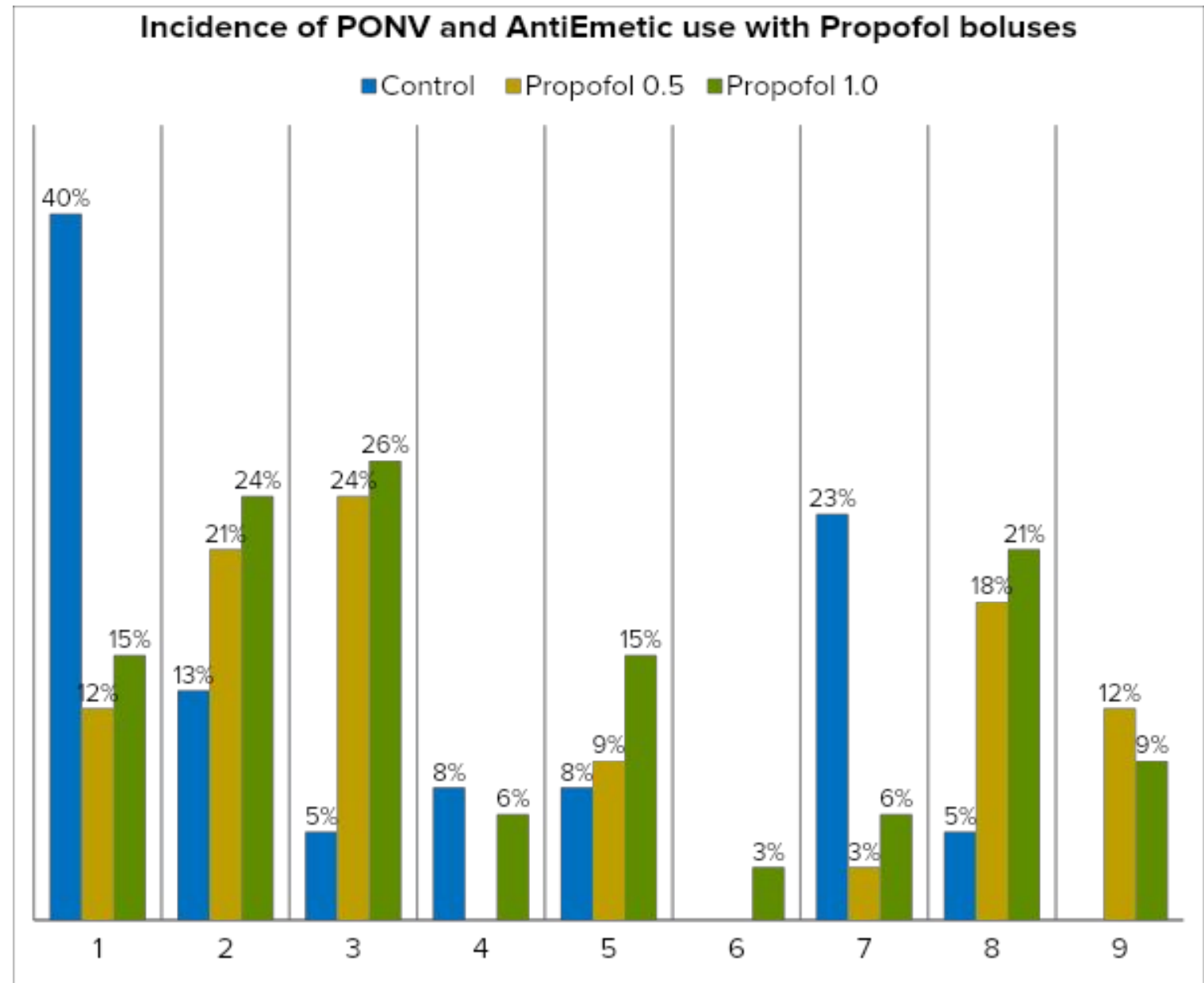
# PONV

## Role of propofol

Propofol bolus at end-of-surgery reduces PONV relative to control

It is not very good for PDNV

Redisplay from: Kim, E, Park, HJ, Kang, H, et al. Antiemetic effect of Propofol administered at the end of surgery in laparoscopic assisted vaginal hysterectomy. *Korean J Anesthesiol.* 2014.66(3):210-215.



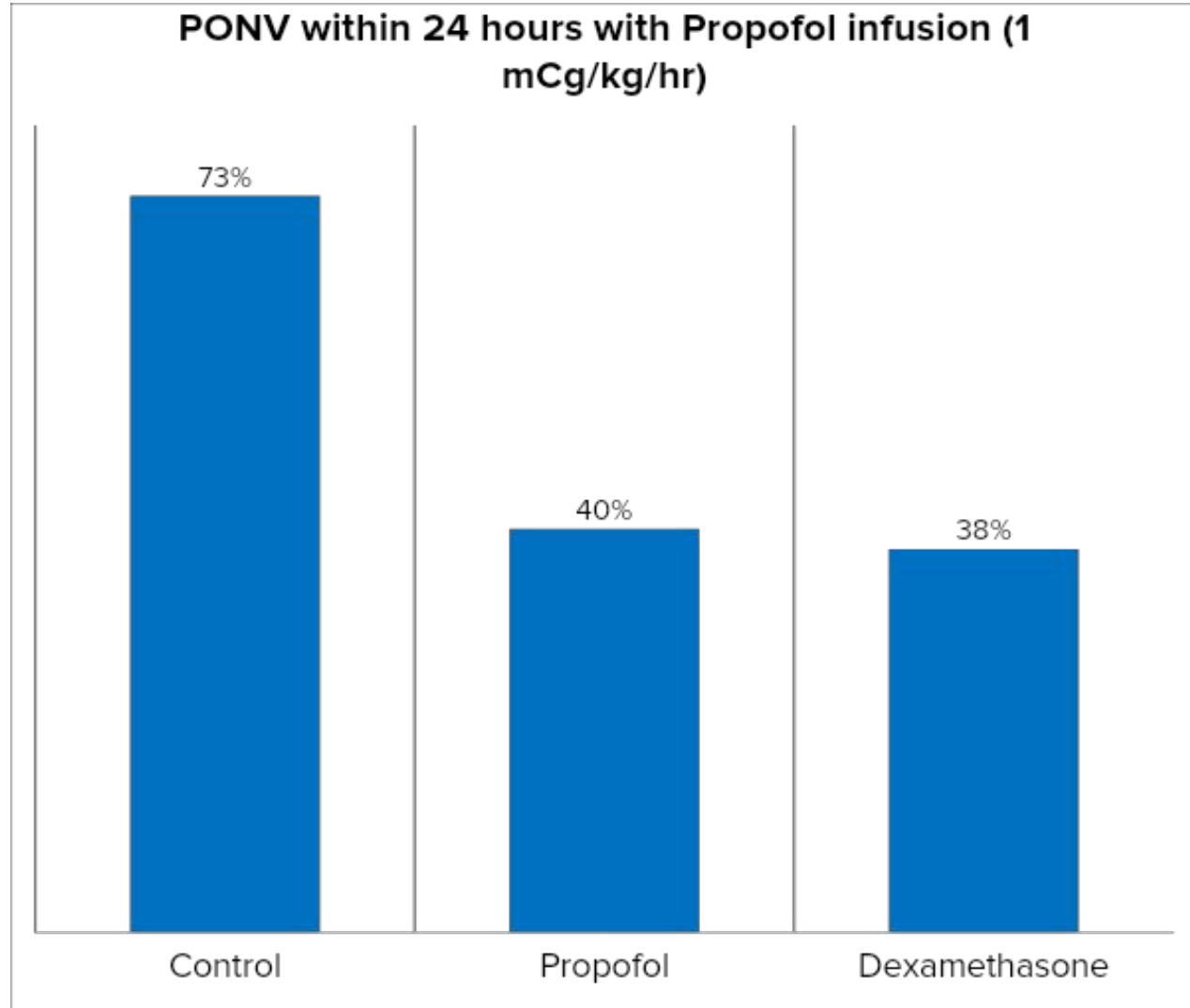
# PONV

## *Role of propofol*

Propofol “background” infusion is as effective as dexamethasone at PONV reduction relative to control

It is not very good for PDNV

Dexamethasone more cost-effective



Redisplay from: Celik, M, Dostbil, A, Aksoy, M, et.al. Is infusion of subhypnotic propofol as effective as dexamethasone in prevention of postoperative nausea and vomiting related to laparoscopic cholecystectomy? A randomized controlled trial. *Biomed Res Int.* 2015;article 349806:1-5.

# PONV: *Role of propofol*

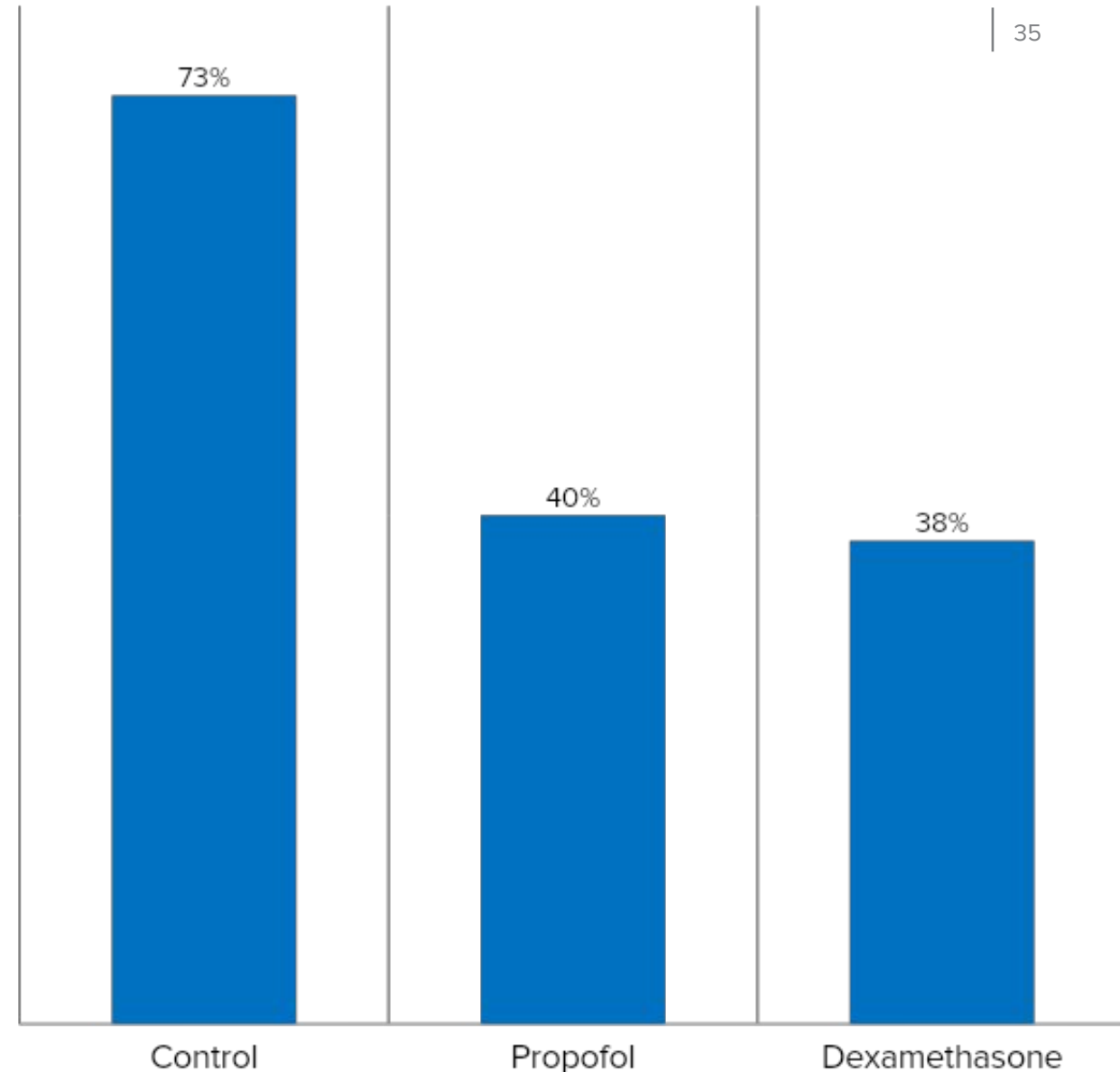
Propofol “background” infusion is as effective as dexamethasone at PONV reduction relative to control

It is not very good for PDNV

Dexamethasone more cost-effective

*Redisplay from:* Celik, M, Dostbil, A, Aksoy, M, et.al. Is infusion of subhypnotic propofol as effective as dexamethasone in prevention of postoperative nausea and vomiting related to laparoscopic cholecystectomy? A randomized controlled trial. *Biomed Res Int.* 2015;article 349806:1-5.

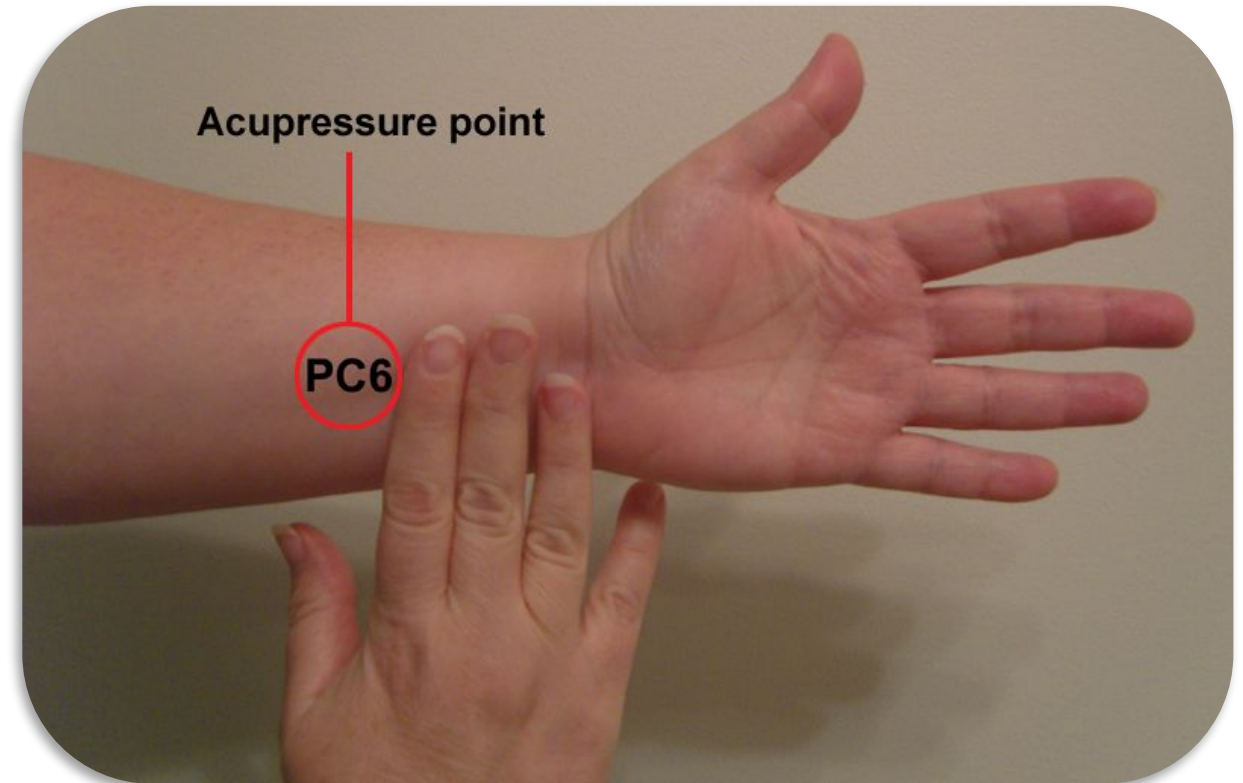
PONV within 24 hours with Propofol infusion (1 mg/kg/hr)



# PONV

## *P6 acupressure stimulation*

- Can be performed intraoperative
  - Inject 2cc of saline at the acupuncture site
- Study showed 4x increase in PDNV in control group versus acupuncture group
- Acupuncture/acupressure coupled with ondansetron showed significantly reduced PDNV compared to ondansetron alone



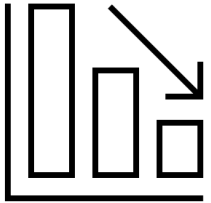
Odom-Forren, J, Fetzer, S, Moser, D. Evidence-Based Interventions for Post Discharge Nausea and Vomiting: A Review of the Literature. *Journal of PeriAnesthesia Nursing*. 2006;21(6):411-430.

# PONV

## P6 stimulation



Safe and effective



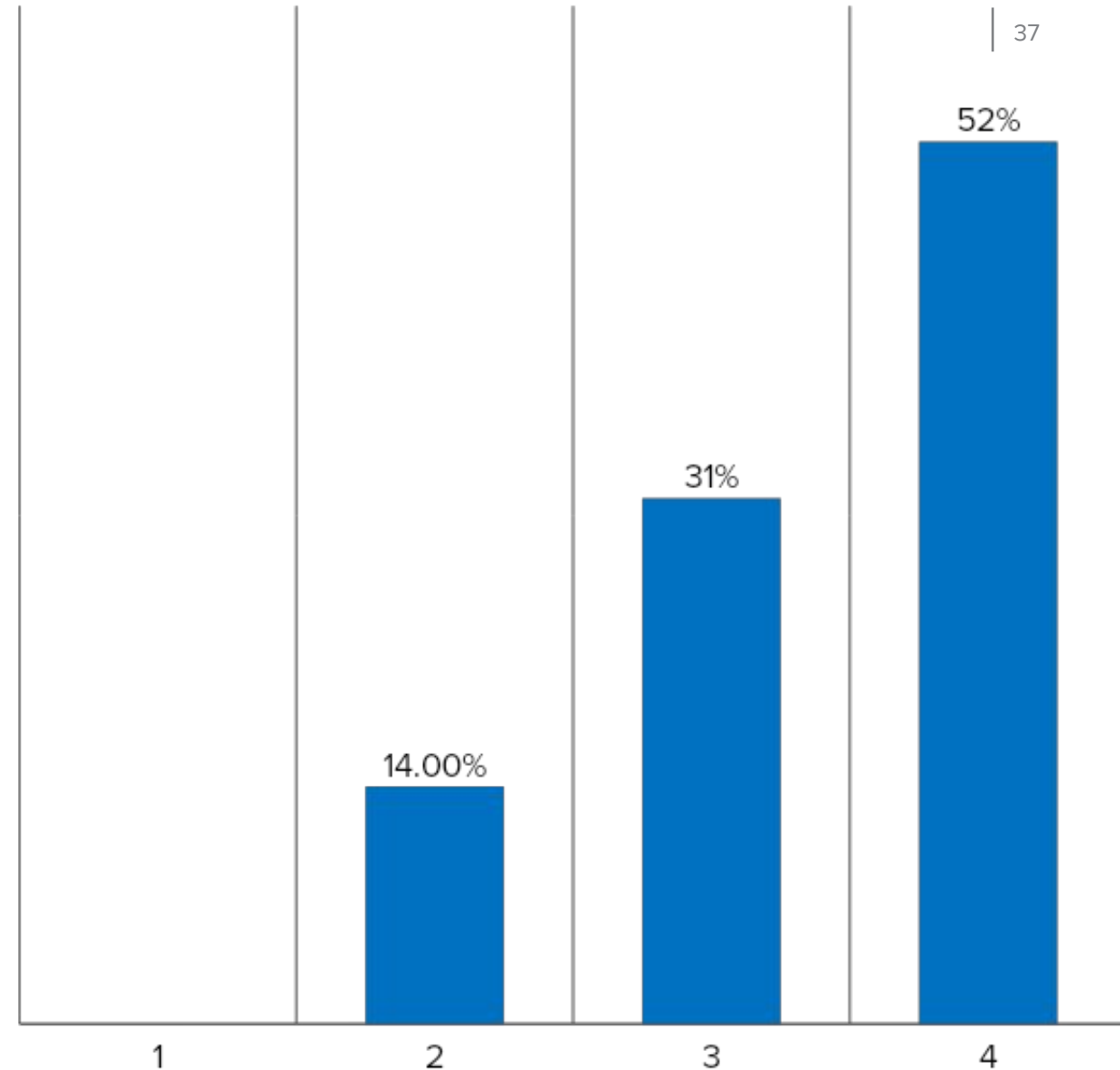
Reduces PONV & PDNV

○ ○ ○ Suitable alternative or adjunct

Carr, KL, Johnson, FE, Kenaan, CA, et al. Effects of P6 stimulation on postoperative nausea and vomiting in laparoscopic cholecystectomy patients. *J PeriAnesthesia Nursing*. 2015;30(2):143-150.

Holly, C. Acupuncture to prevent postoperative nausea and vomiting: An evidence-based alternative to antiemetic drugs. *Am J Nurs*. 2010;110(9):57.

Effect of P6 stimulation on Ponv and pdnv incidence





# PONV: What doesn't work...



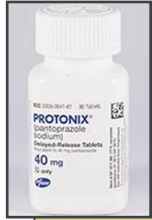
Music therapy



Isopropyl alcohol inhalation



NG tubes



Proton pump inhibitors



Nicotine patch for non-smokers



Hypnosis



Marijuana



Cannabinoids



Short-dosing neostigmine



Aroma therapy



High inspired oxygen

- Gan, TJ, et al. *Anesth Analg.* 2014;118(1):85-113.
- Hines S, Steels E, Chang A, Gibbons K. *Cochrane Database of Systematic Reviews.* 2018; Issue 3. Art. No.: CD007598.

# Rescue medications

- Overall, 45% of studied patients required a rescue medication within 72 hours
  - Usually a 5-HT<sub>3</sub> or promethazine

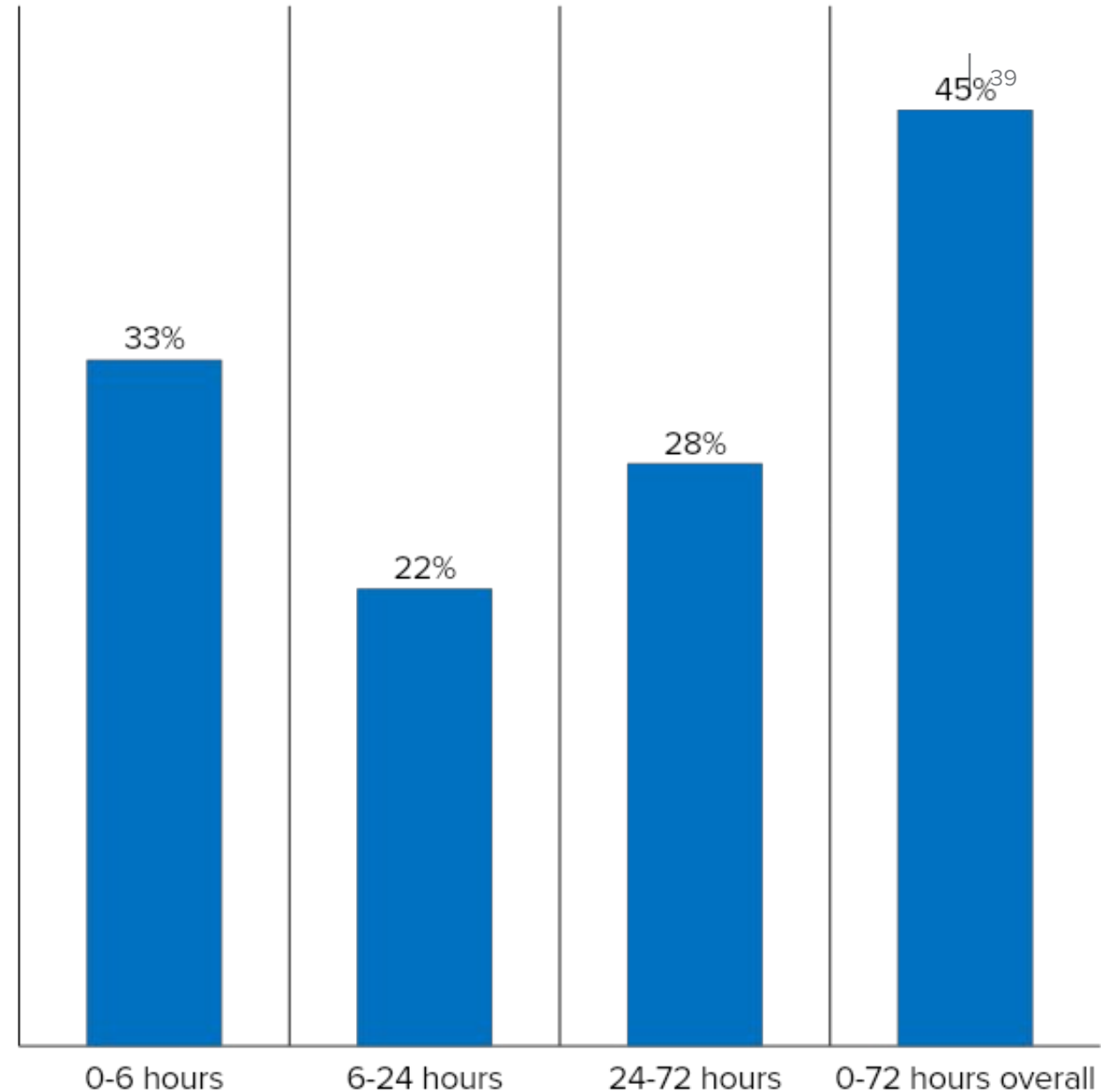
***Begs the questions:***

***Can risk stratification identify the patient at risk for PDNV?***

***Wouldn't a long-acting agent be more efficacious?***

*Redisplayed from: White, PF, O'Hara, JF, Roberson, CR, et al. The impact of current antiemetic practices on patient outcomes: A prospective study on high-risk patients. Anesth Analg. 2008;107(2):452-458.*

Percentage of patients using rescue medications



# PONV

## *Advances in genomic medicine*

Genomic medicine is an emerging medical discipline that involves using genomic information about an individual as part of their clinical care (e.g. for diagnostic or therapeutic decision-making) and the health outcomes and policy implications of that clinical use



Multiple CYP450 alleles exist

Inhibited or induced by a variety of common medications



Genomic information allows for more precise anesthetic planning

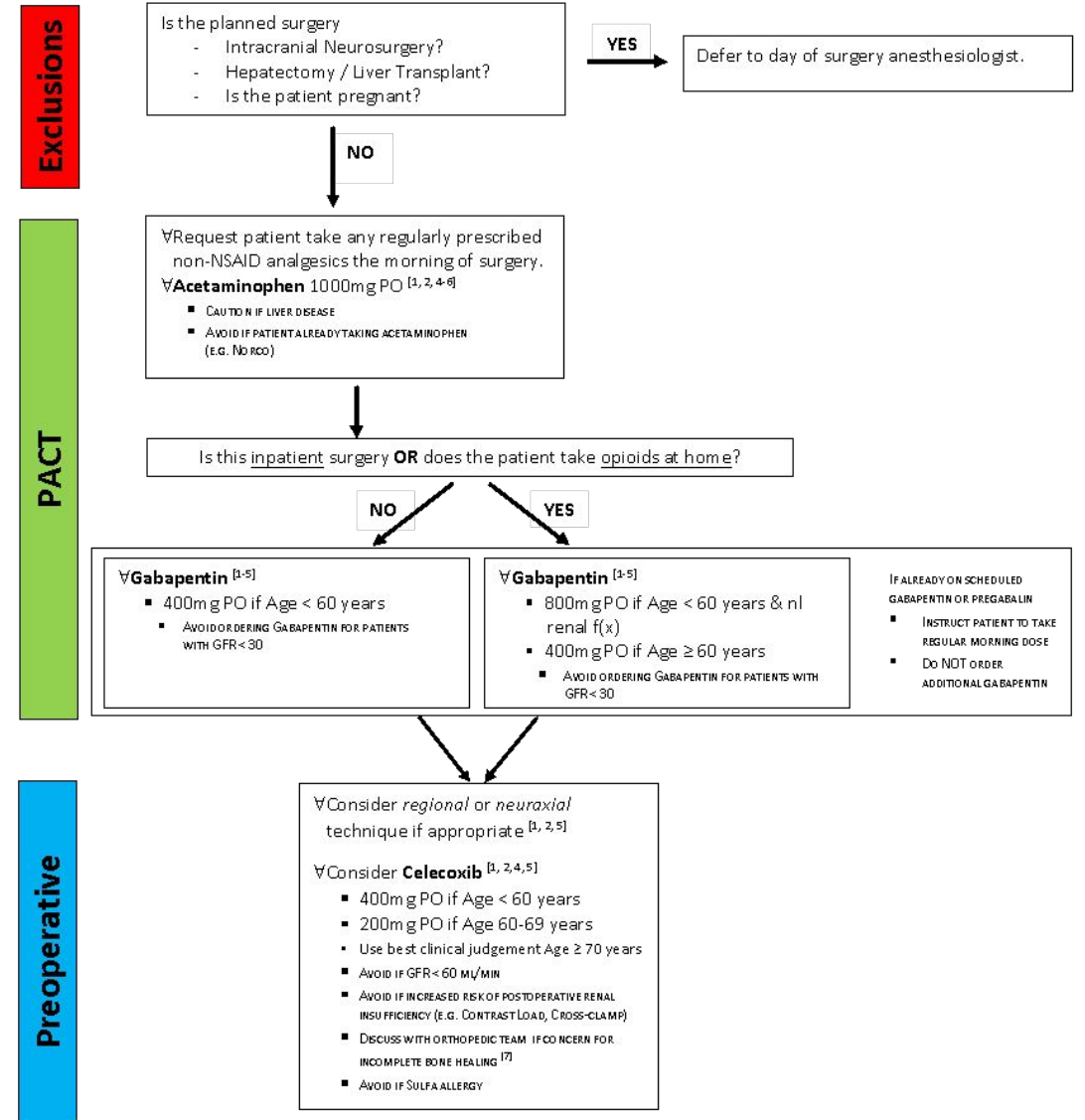


# Control PONV → Control Pain

- Multimodal approach
- Use of pre- and intraoperative adjuncts
  - Local/regional blocks
  - NSAIDs
  - Gabapentin
- Appropriate use of opioids

Abolition of pain or nausea is not a realistic goal

## Multimodal Analgesia PROMPT (for patients ≥ 18 years and ≥ 50 kg)



# Control PONV → Standardize your approach

---

- **Other considerations:**

- Hydrate patients
  - Encourage unlimited fluids up to 2 hours prior to surgery
  - Outpatient, low-risk procedures:
    - 20 ml/kg crystalloid associated with reduced PONV
  
- Don't push patients to eat/drink in PACU
  - They'll eat when hungry and drink when thirsty

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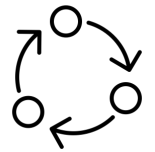
PONV

Risk Factors (each risk factor adds a score of 1): Female (1) / Non smoker (1) / History of PONV (1) / History of Motion Sickness (1) / Intended administration of opioids for postoperative analgesia (1)

Patient Risk: Low (< 3 patient-related risk factors) / High (> or = 3 risk factors, patient receives at least two anti-emetics of different classes)

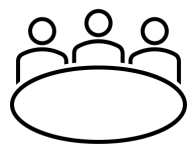
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# Measuring personal compliance



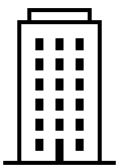
## Process controls

- Individual compliance
- Internal to design of process to mitigate risk



## Internal controls

- Departmental compliance
- Assures operational effectiveness and efficiency



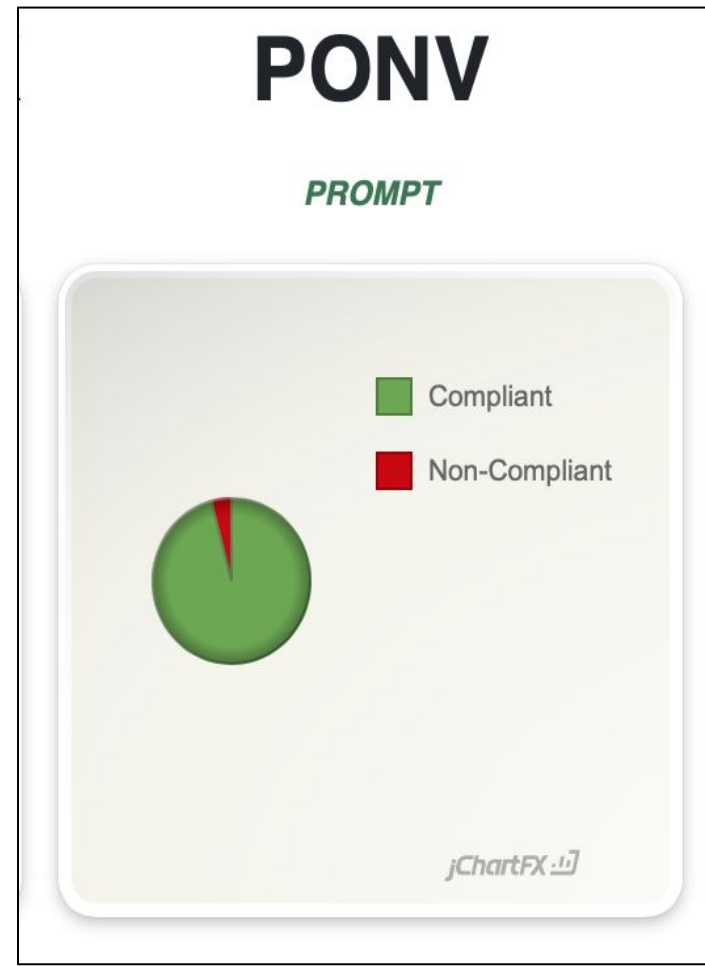
## Enterprise controls

- Hospital compliance
- Synchronizes strategy with operational execution

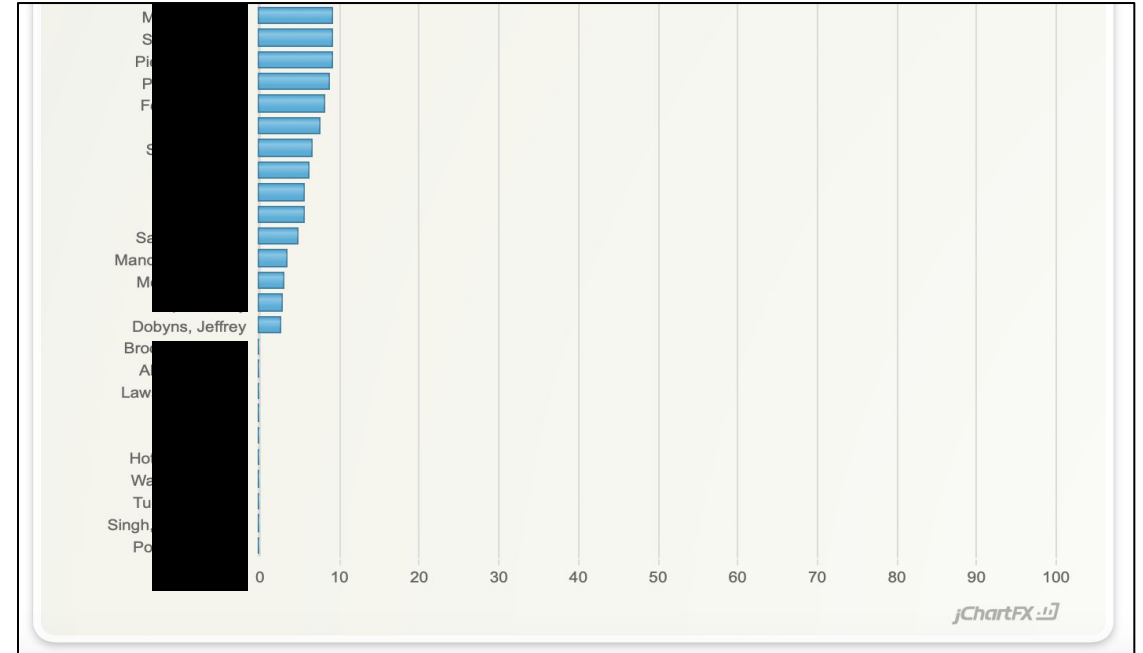
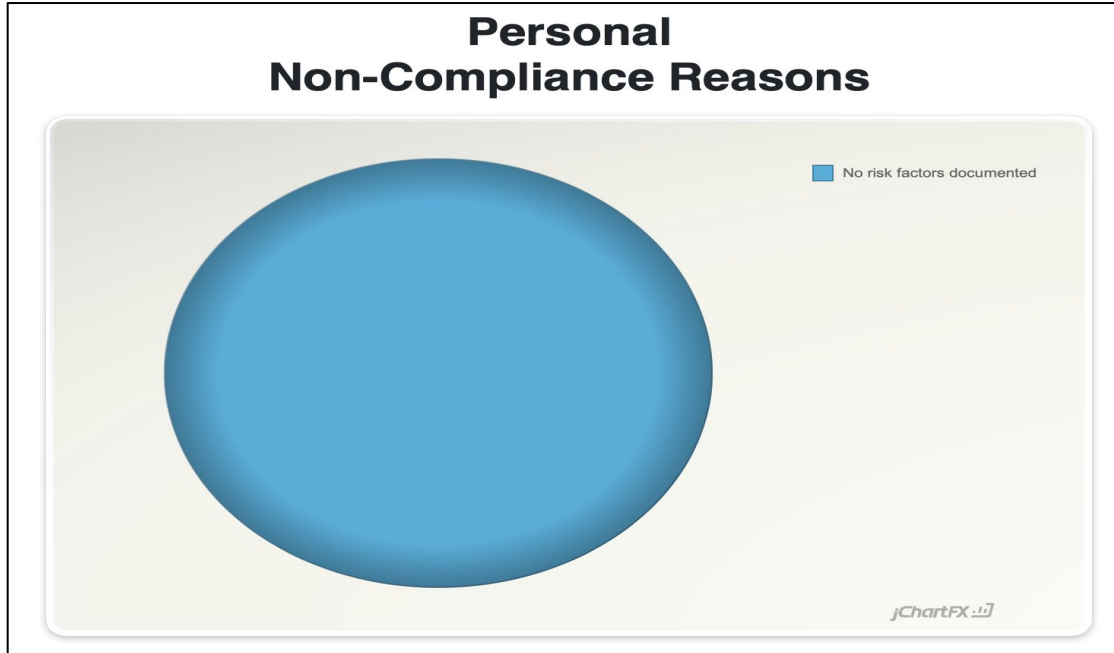


## External controls

- Government regulations & industry standards
- An action taken by an outside party that impacts a business



# Measuring personal non-compliance and peer pressure



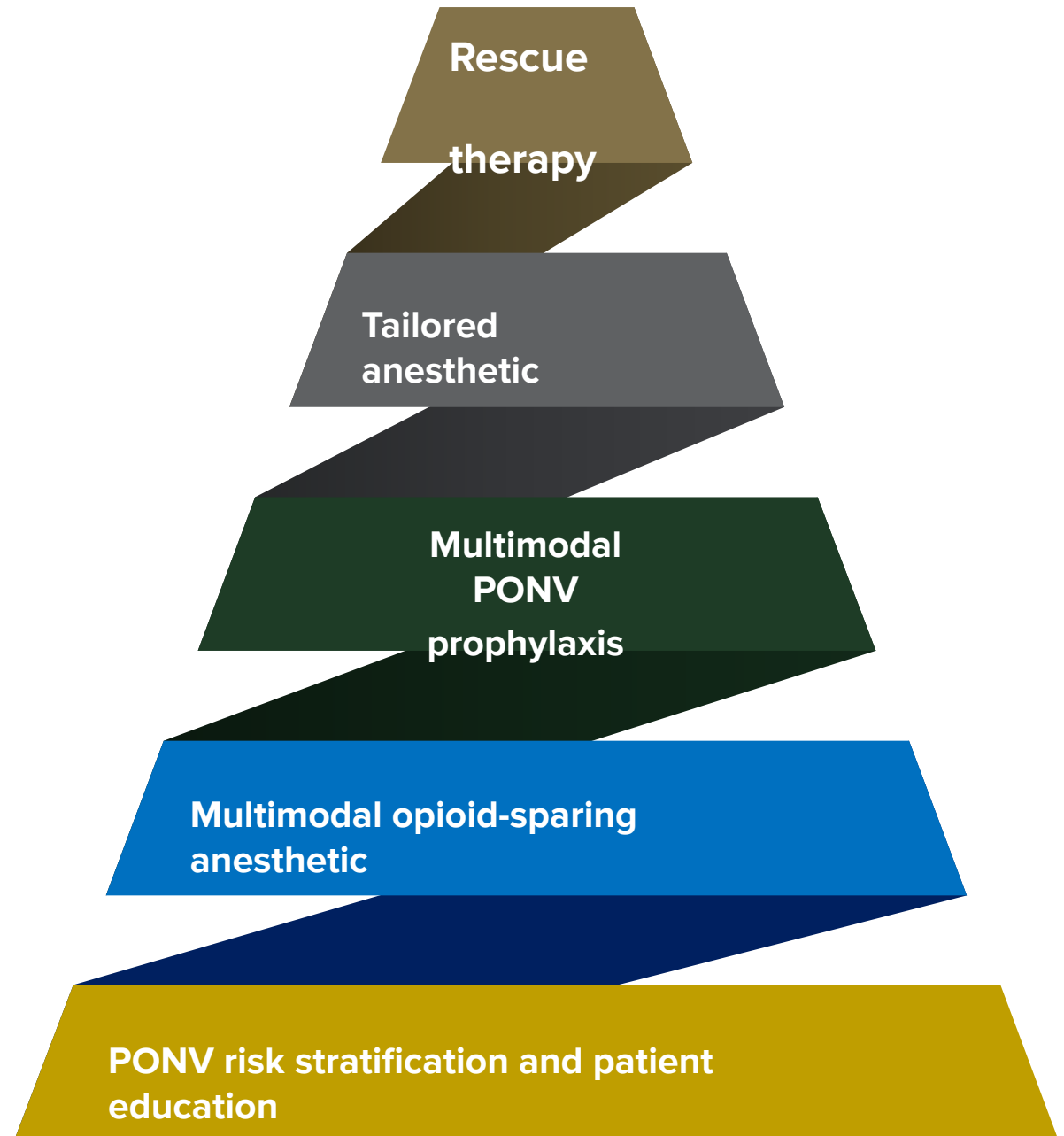
**Behavioral change theory:** attempts to explain why behaviors change, citing environmental, personal, and behavioral characteristics as the major factors in behavioral determination

- Increased interest in application to areas of health, education, criminology, energy and international development anticipating that understanding behavioral change will improve services offered in these areas



## *Summing up PONV*

- Risk stratification and patient education form the foundation for PONV management
- Use opioids as appropriate
- Make sure patients are discharged home with PONV rescue therapy



# PDNV

## General information

- Precise definition still a bit nebulous
  - *Nausea and vomiting that occurs after the patient has left the hospital or ambulatory facility*
  - *Generally, nausea and vomiting that occurs from 24-hours from surgery on...*



Symptoms are seldom serious or life-threatening

Unpleasant and distressing

Major impact on overall functional status of patients

Delays resumption of normal daily activities and readiness for work

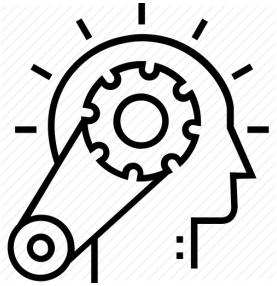
Potential economic impact for health care providers and patients

Leads to failure to comply with analgesic prescriptions



# PDNV

## What do the patients say?



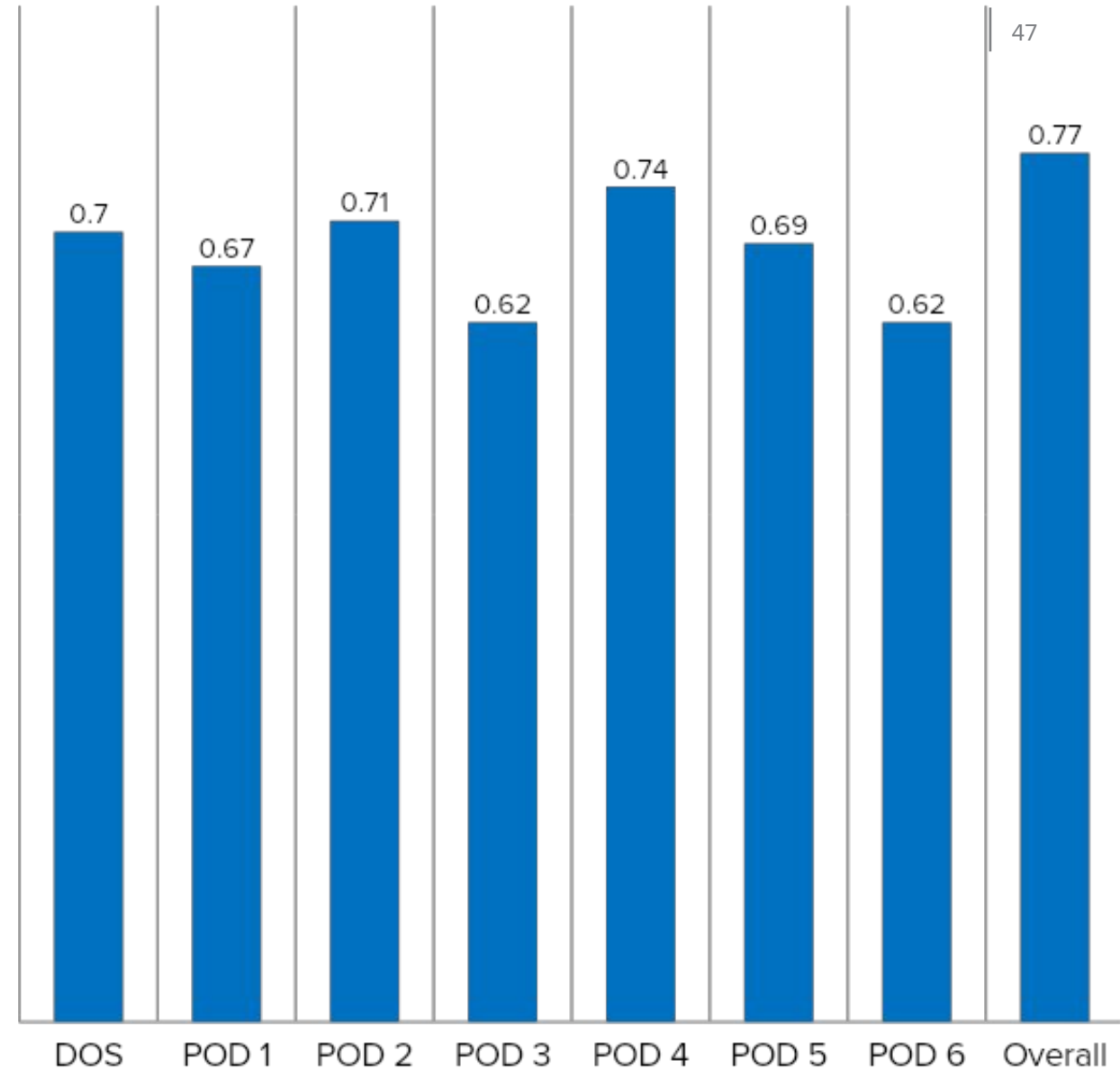
PDNV significantly reduces the quality of patient recovery



Prevention of PDNV

1. Redisplayed from: Odom-Forren, J, Hooper, V, Moser, DK, et al. Postdischarge nausea and vomiting: Management strategies and outcomes over 7 days. *J PeriAnesth Nurs.* 2014;29(4):275-284.

### Correlation between PDNV and patient quality of life<sup>1</sup>



# PDNV

## Management strategy

- **PDNV management begins with preoperative prevention**
  - Most available antiemetics have short half-lives and are unsuitable for PDNV prophylaxis
  - Combination therapy better than monotherapy
  - Need antiemetics with different mechanisms of action

Identify risk factors and risk stratify patients

Use combination prophylactic antiemetic therapy for high-risk group

Consider long-acting prophylactic interventions

Consider non-pharmacologic interventions (acupoint A6 stimulation)

Include rescue antiemetic medication in discharge prescriptions

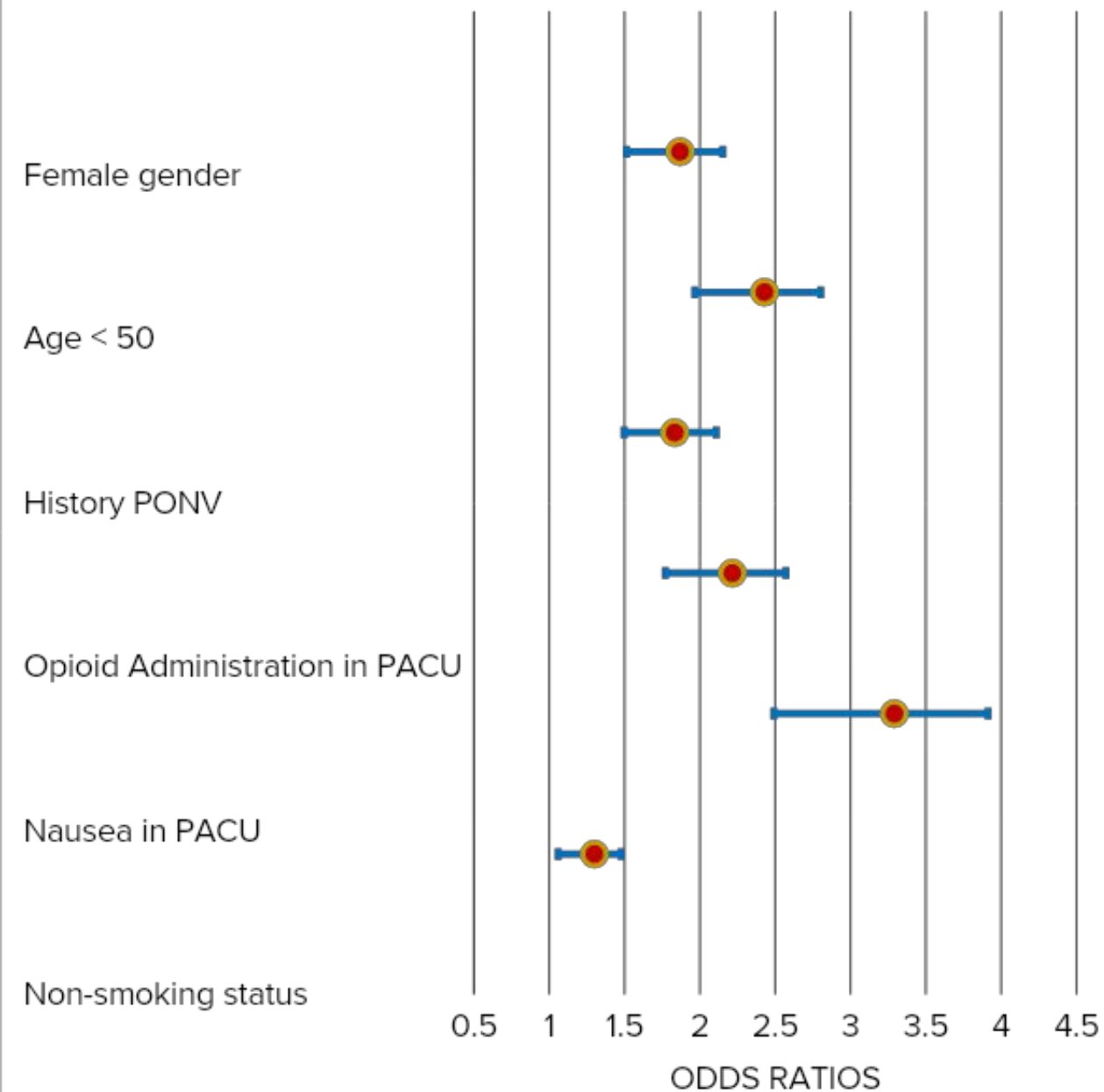
Ensure effective postoperative multimodal analgesia

Patient education

Ensure adequate follow-up



# INDEPENDENT PREDICTORS OF PDNV



## PDNV: *risk factors*

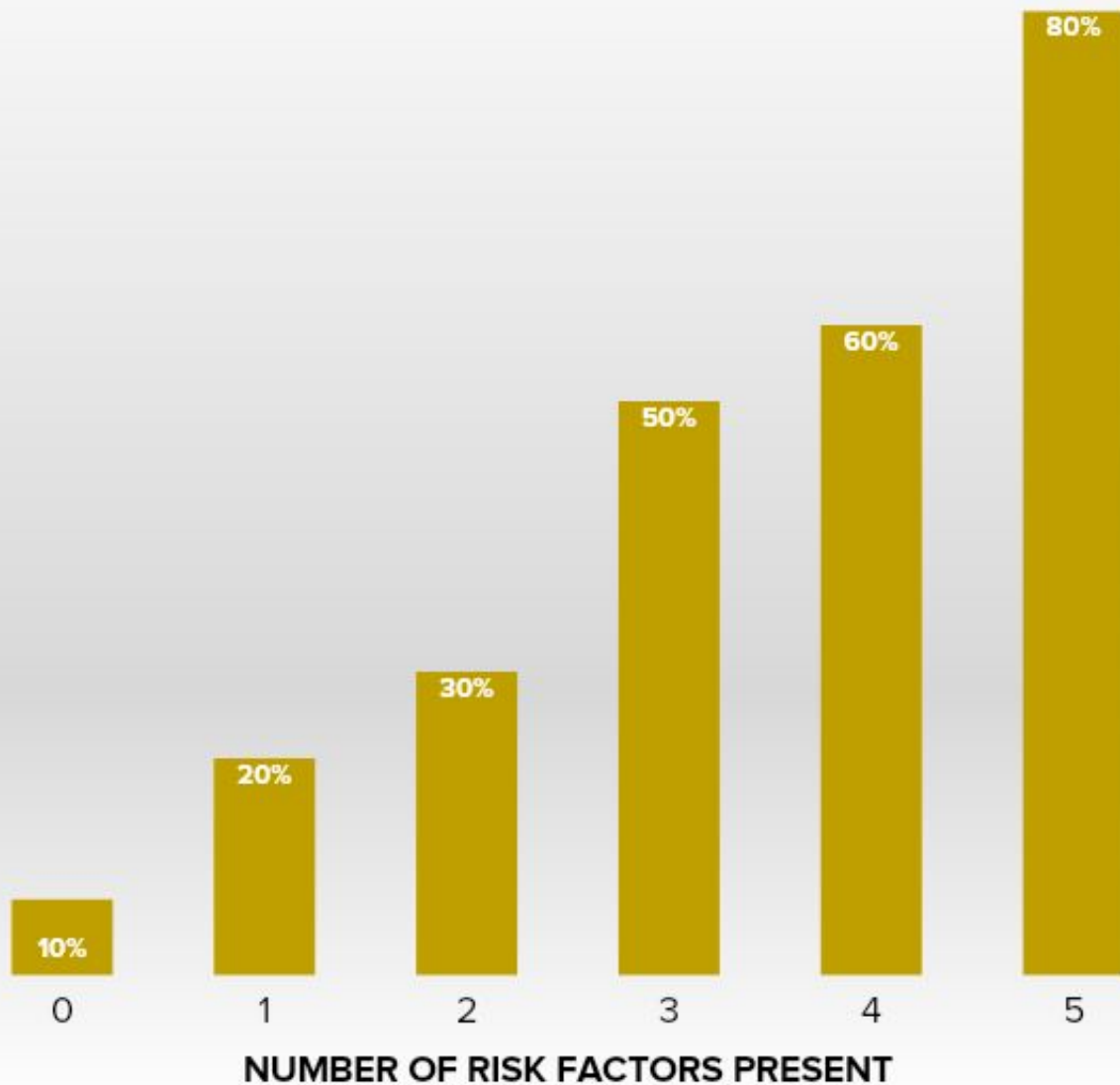
- Non-smoking status
  - Risk factor for PONV but **not** PDNV
- Surgical approach statistically significant for PONV but **not** PDNV

### ***Main difference between risk factors for PONV and PDNV:***

Patients who were nauseated in PACU had 3-fold increased risk for PDNV

Redisplayed from: Apfel, CC, Philip, BK, Cakmakkaya, OS, et al. Who is at risk for postdischarge nausea and vomiting after ambulatory surgery? *Anesthesiology*. 2012;117(3):475-486.

INCIDENCE OF PDNV BY  
NUMBER OF RISK FACTORS



## PDNV: *risk stratification*

- Overall incidence: > 45%
- Female gender
- Age less than 50 years
- History of nausea and/or vomiting after previous anesthesia
- Opioid administration in PACU
- ***Nausea in PACU***



Nausea in PACU most significant predictor of PDNV

Redisplayed from: Apfel, CC, Philip, BK, Cakmakkaya, OS, et al. Who is at risk for postdischarge nausea and vomiting after ambulatory surgery? *Anesthesiology*. 2012;117(3):475-486.

# PDNV

## Medical management



Medication	Usual adult dose	Comment
<b><i>5-HT<sub>3</sub> Antagonists</i></b>		
Granisetron (Kytril)	Transdermpatch	Patch may be effective for PDNV
Palonosetron (Aloxi)	0.075 mg IV	Long duration makes effective for PDNV
<b><i>Glucocorticoids</i></b>		
Dexamethasone (Decadron)	4-8 mg IV	More effective for PDNV than PONV; cost-effective
<b><i>Anticholinergic</i></b>		
Scopolamine (Transderm-Scop)	Transdermpatch	Long duration makes effective for PDNV; patient dissatisfaction
<b><i>Neurokinin Antagonist</i></b>		
Aprepitant (Emend)	40 mg PO	Long duration makes effective for PDNV
Rolapitant (Varubi)	200 mg PO	Remarkably long half-life (180 hours) makes effective for PDNV

Nagelhout, JJ, Plaus, KL. *Nurse Anesthesia*. (5<sup>th</sup> ed.). 2014; St. Louis: Elsevier.

*“...put it on before bed, and when I woke up my vision was so blurred that I couldn’t even read the time on my phone or stove. I couldn’t text, see the TV guide or anything. Luckily I had Siri on my iPhone activated and she assisted me in calling for help. I unfortunately didn’t gain my full vision back until 36 hours later. One of the worst experiences...”*  
(January 14, 2019)

*“...I was very pleased to be nausea free. Things changed about 8 hours after taking off the patch. Stationary objects in my house began to twist and turn very slowly. For example, my computer monitor appeared to turn my direction, and my ceiling fan blades moved like octopus tentacles. I looked up side effects and read that it can cause hallucinations. Unfortunately, it is still happening 12 hrs later. Now my pupils are slightly dilated, and I'm seeing double, along with slight nausea and a headache. The effectiveness of the medication during use does not outweigh these side effects.”* (March 21, 2019)

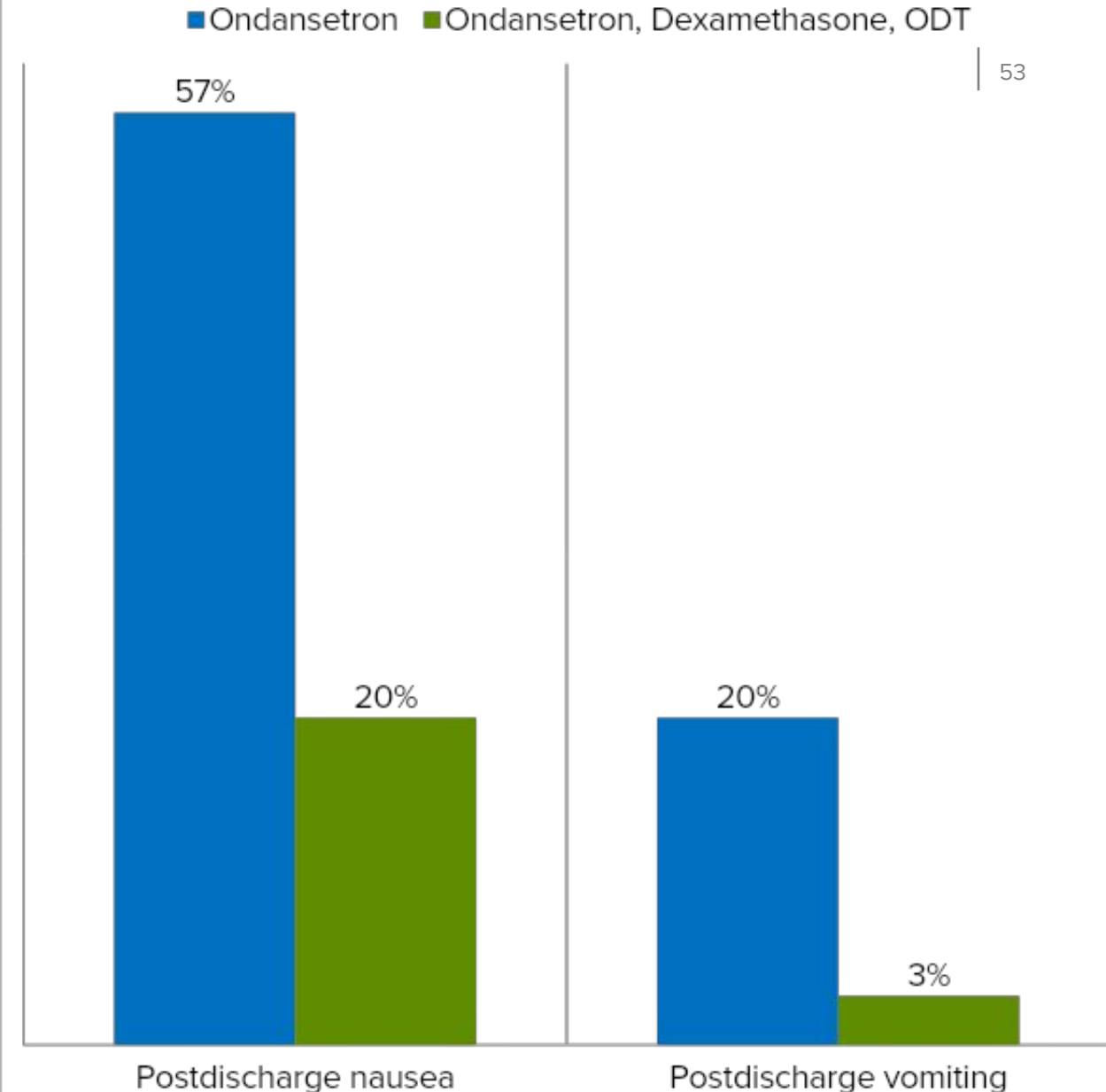
Retrieved from: <https://www.drugs.com/comments/scopolamine/transderm-scop.html>

# PDNV: *management strategies*

- Multimodal strategy
  - Different medications; different mechanisms of action
  - Rescue medications for PDNV
- Multimodal strategy more effective against PONV and PDNV than monotherapy

Pan, PH, Lee, SC, Harris, LC. Antiemetic prophylaxis for postdischarge nausea and vomiting and impact on functional quality of living during recovery in patients with high emetic risks: A prospective, randomized, double-blind comparison of two prophylactic antiemetic regimens. *Anesth Analg.* 2008;107(2):429-438.

## Mono- versus multimodal therapy



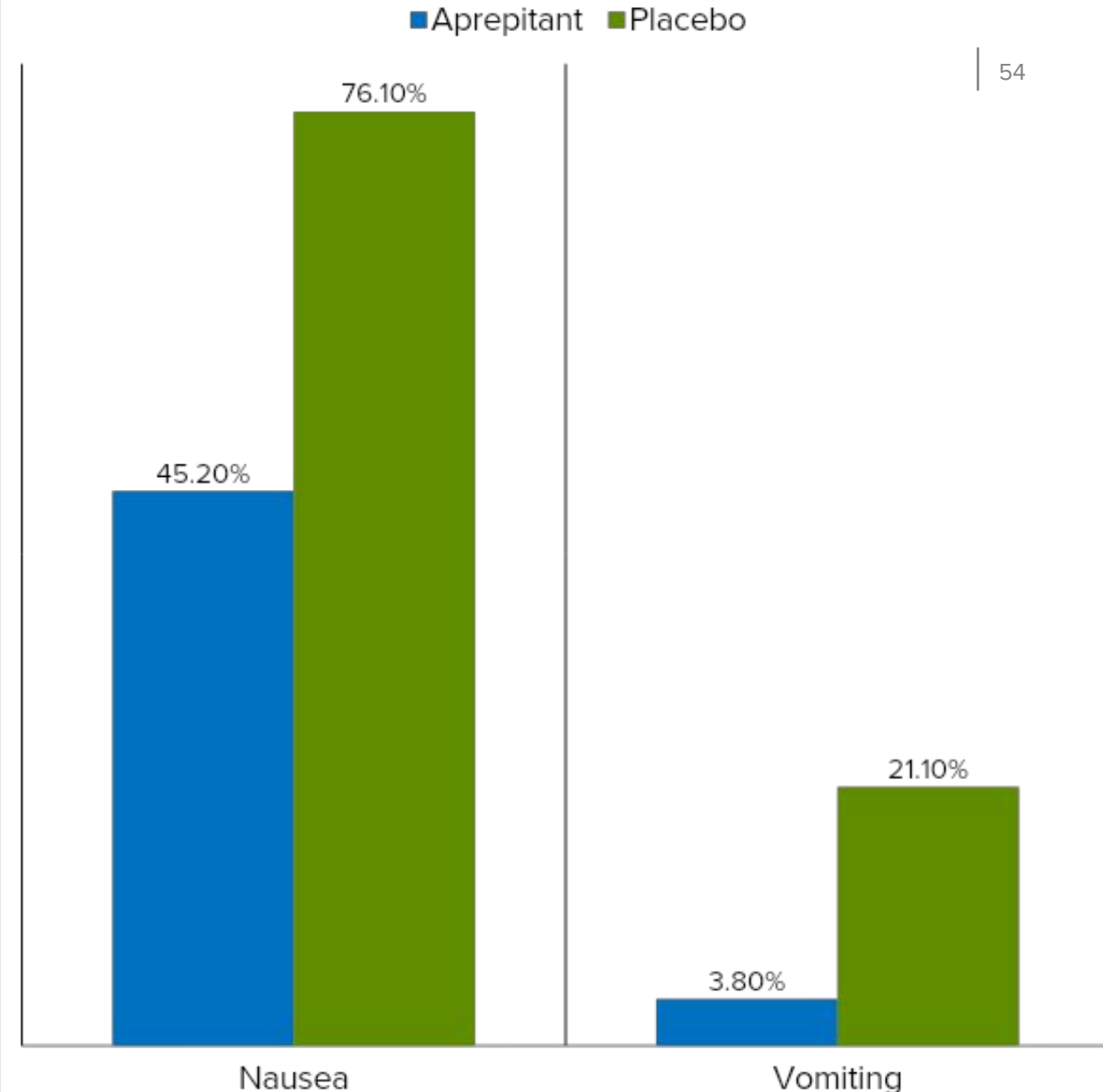
# PDNV

## NK-1 receptor antagonist

- Started as treatment for nausea and vomiting after chemotherapy
- A selective human substance P and neurokinin-1 receptor antagonist
- Decreased need for rescue anti-emetic medication
- Synergistic effect when given with ondansetron
- Multiple drugs in this class that can be used
- Possible 48-hour relief with one pill

Redisplayed from: Liu, M, and Zhang, H. Neurokinin-1 Receptor Antagonists in Preventing Postoperative Nausea and Vomiting. *Medicine*. 2015;94(19)

### NK-1 Antagonist PDNV Incidence reduction



## *Test your knowledge*

Which of the following complementary or alternative medical treatments has been shown to be as efficacious as ondansetron in the prevention of PONV:

- A. Inhaled alcohol vapor
- B. Music therapy
- C. Acupuncture
- D. Ginger

## Test your knowledge

Which of the following complementary or alternative medical treatments has been shown to be as efficacious as ondansetron in the prevention of PONV:

- A. Inhaled alcohol vapor
- B. Music therapy
- C. Acupuncture**
- D. Ginger

**Answer: C**

Acupuncture/acupressure at the pericardium-6 (P6) acupuncture point has been shown in multiple studies to have the same preventive rate as ondansetron for PONV.





# Summary and Conclusion

## Key points

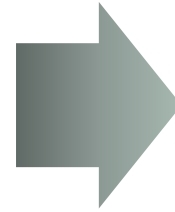
- If one approach fails, try something else
- Patients consider PONV one of, *if not the*, most significant adverse outcome
- 26% reduction in relative risk of PONV for each additional antiemetic intervention
- Nausea in PACU is most significant predictor of PDNV
- PDNV greatly reduces the quality of patient recovery
- Be aggressive with PONV prophylaxis

# Summary and conclusion



## PONV

- Risk stratify patients
- Aggressive prophylaxis in high-risk patients




## PDNV

- Preventing PONV is key to preventing PDNV
- Significantly worsens quality of recovery



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 [jdobyns@uabmc.edu](mailto:jdobyns@uabmc.edu)

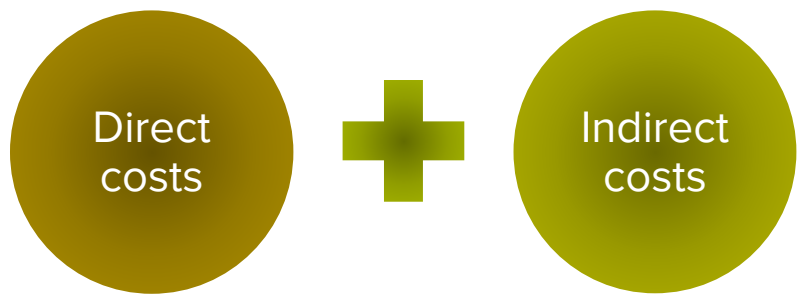
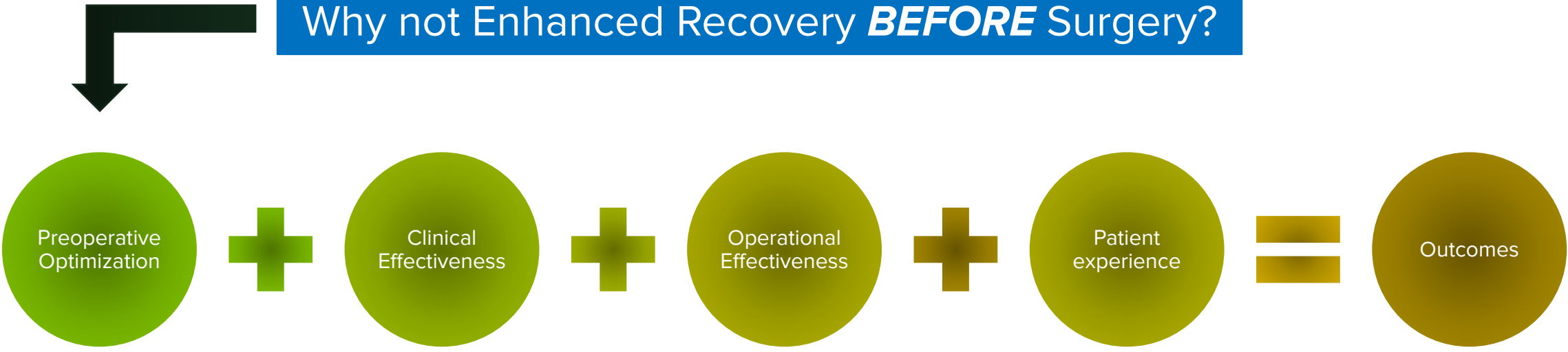
 <https://www.uab.edu/medicine/anesthesiology/>

**UAB** THE UNIVERSITY OF  
ALABAMA AT BIRMINGHAM.

**EXTRA**

# Opportunities Exists in Preoperative Optimization

Why not Enhanced Recovery **BEFORE** Surgery?



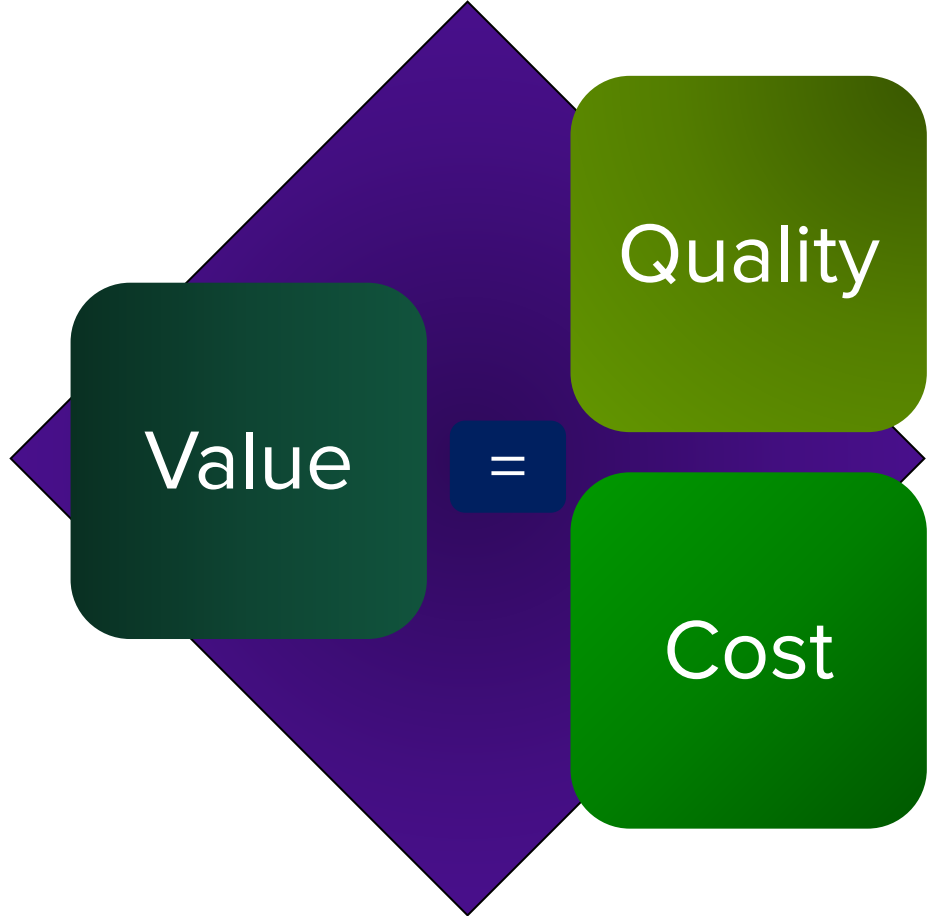
Preoperative Optimization is:

*“The process of improving modifiable comorbidities, increasing nutritional and metabolic reserve, and preparing the patient psychologically to best handle the physiologic stress of surgery.” (Arthur M. Boudreaux, MD)*

Image adapted from: © Arthur Boudreaux, MD 2019

# The value of PONV management

- Multiple factors determine value
- Quality is a function of:
  - Patient
  - Family
  - Anesthesia team
  - Care givers
- Cost is a function of:
  - Direct costs
    - Drug acquisition cost
    - Administration fee
    - Profit for healthcare institution
  - Indirect costs
    - Time off work
    - Lost income



# PONV: *Etiology*



## Patient-specific factors

- Gender
- History of PONV and/or motion sickness
- Age

## Surgery-related factors

- Duration of surgery
- Procedure (gynecologic, eye, plastic)

## Anesthetic-related factors

- General anesthesia
- Volatile anesthetics
- Postoperative opioids

## Postoperative factors

- Postoperative opioids
- Nausea in PACU
- Pain control



# Summary and conclusion



## PONV

- Risk stratify patients
- Aggressive prophylaxis in high-risk patients

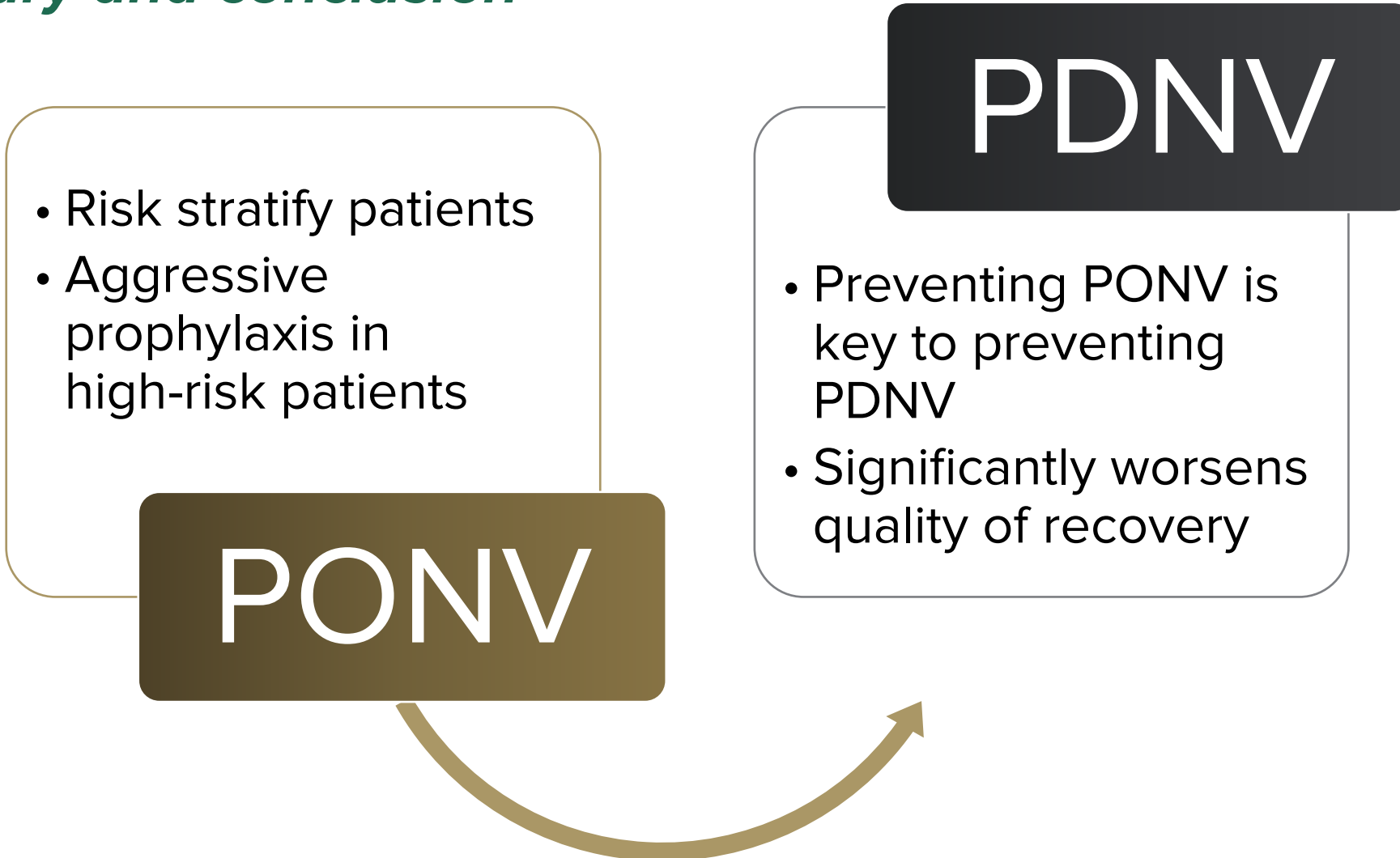


## PDNV

- Preventing PONV is key to preventing PDNV
- Significantly worsens quality of recovery

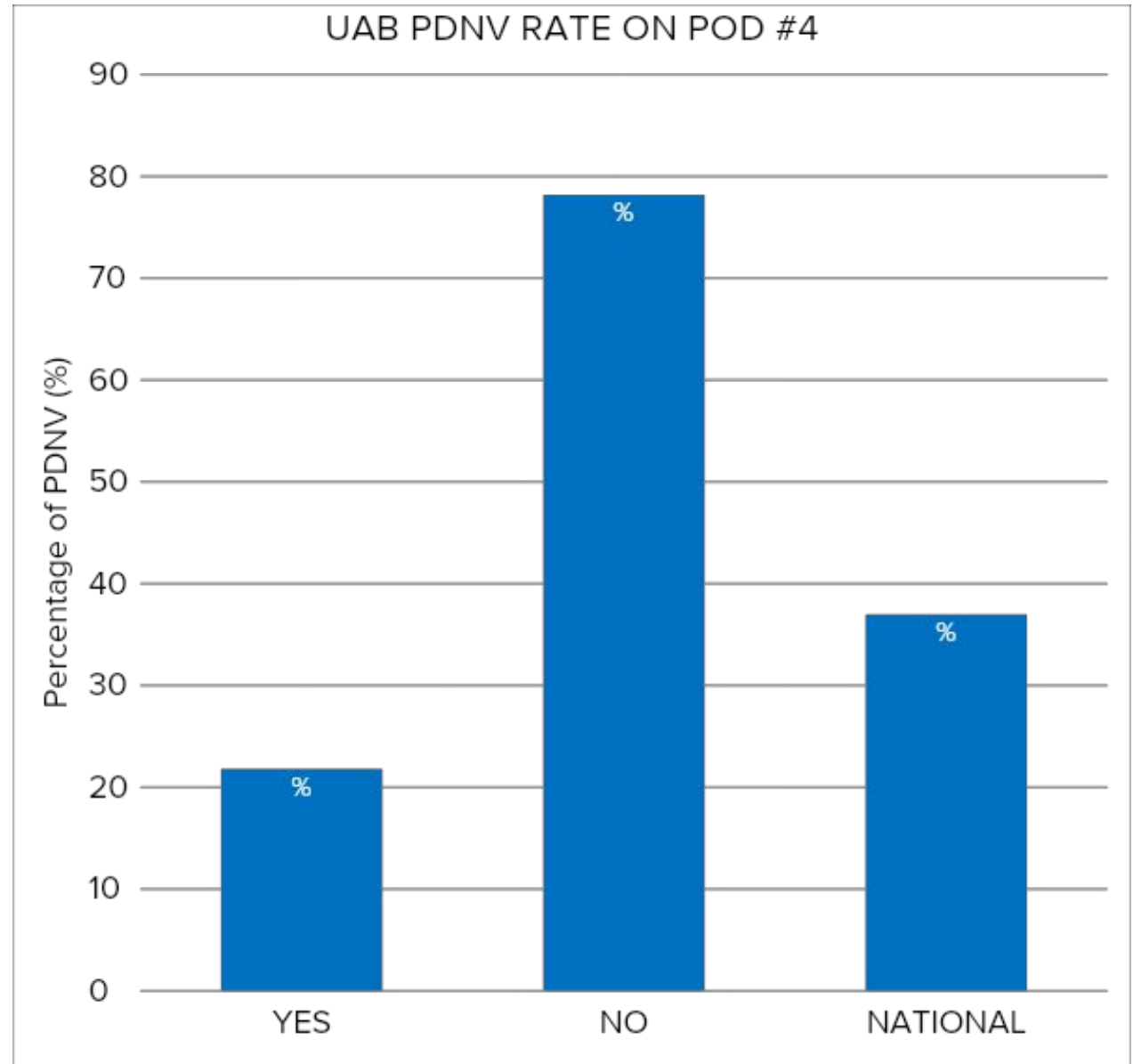
# PONV/PDNV

## Summary and conclusion

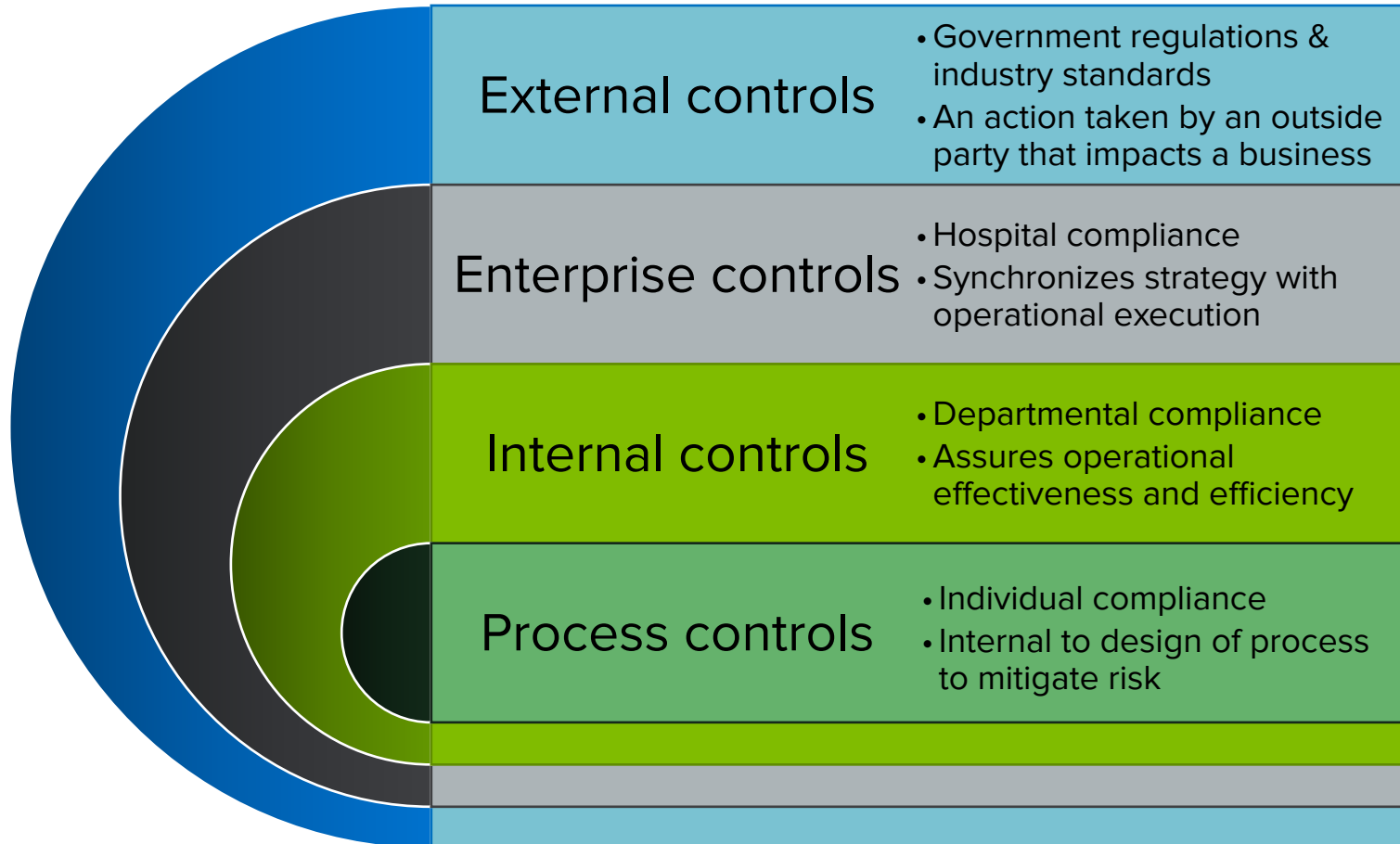


## UAB PDNV Rate on Day 4 compared to national average

- 2018 satisfaction survey results
  - 43% response rate
  - 2175 responses
- Survey asks about nausea on POD #4
- Reported incidence: 37%
- UAB incidence: 22%
  - Dexamethasone use: < 30%
- *Conclusion: perform more detailed analysis*



# Measuring personal compliance



- “Compliance” refers to sticking to the rules
- “Compliance management” is the process by which managers ensure compliance with laws and standards

