PONV, PDNV – What’s The Impact On Ambulatory Surgery?

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University of Scranton/WVHCS
School of Anesthesia
“One thought driven home is better than three left on base”

James Liter
Changing Environment: *Anesthesia*

- Inpatient
  - Outpatient
  - Office-Based
Incidence of PONV*

- Historically 75% to 80% with ether
- Currently 25% to 30% overall
- More than 35% of surgical outpatients experience PONV after discharge
  - 1.7 days for nausea
  - 0.7 days for vomiting
- Estimates of PONV < actual occurrence
- Post-discharge PONV not well studied and may be undertreated

*PONV: postoperative nausea and vomiting.

PONV: Risk Factors

- Patient
- Anesthesia
- Surgical
- Postoperative
PONV: *Risk Factors*

**Patient**

- Age
- Gender
- Obesity
- Predisposition
- Anxiety
- Nonsmoker
- Pain
- Emetogenic meds
- Medical disease
- Metabolic
- Increased ICP
Age and Obesity

- **Age**
  - Infancy 5% → Childhood (aged 6-16 years) 34%-51%
  - Stabilizes in adulthood → Decreased after age 70 years

- **Obesity**
  - Difficult airway management
  - Larger reservoir for anesthetic agents
  - Increased gastric volume
  - Increased gastroesophageal reflux

Gender

- PONV is 2-3 times more common in women than in men
- Gender-related factors
  - Progesterone, estrogen, and gonadotropin levels
  - Hormonal fluctuations in menstrual cycle
  - Pregnancy
  - Exogenous hormone therapy for ovum retrieval

Anxiety

• α-Adrenergic mechanism
  – Increased circulatory levels of catecholamines
  – Epinephrine/norepinephrine induces vomiting

• GI factors
  – Air swallowing
  – Decreased motility
  – Increased gastric volume

PONV: Risk Factors
Anesthesia

- Premedications
  - Benzodiazepines
  - Anticholinergics
  - Opioids

- Inhalation gases
  - N\textsubscript{2}O/balanced anesthesia

- Intravenous agents
  - Etomidate > ketamine > thiopental > propofol

- Reversal agents
  - Anticholinesterase

- Airway
  - Gastric distention (mask)
  - Pharyngeal stimulation

- Regional anesthesia
  - Hypotension

- Hydration

Etiology of PONV: Anesthesia-Related Factors

- Type of premedication
  - Benzodiazepines decrease PONV
  - Opioid analgesics stimulate the CTZ
  - NSAIDs help decrease opioid use

- Type of anesthesia
  - General > major regional > peripheral regional
  - Inhalational agents > propofol-based

- Duration of anesthetic exposure

- Experience of anesthesia provider

PONV: *Risk Factors*

*Surgical*

- Surgical site
  - Eye, ENT, laparoscopic, abdominal, OB/GYN, breast, plastics, orthopedics
- Duration of surgery (> 3 hours)
- Gastric distention
  - Food, blood, gastroparesis
- Postoperative pain
  - Pelvic, visceral, bone
- Early ambulation (vestibular)
Postoperative Factors Affecting Incidence of PONV

- Pain
- Dizziness
- Opioid administration
- Premature oral intake
- Movement after surgery

HURRY! THERE'S ONE UNIT SPACE LEFT IN RECOVERY!
The Physiology of Emesis

Adapted from Mitchell and Schein. Toxicity of Chemotherapy. 1984:271.
Anatomy of Emetic Center

The anatomical location of the area postrema and the region of the vomiting center

## Emetogenic Receptors

<table>
<thead>
<tr>
<th>Location</th>
<th>Receptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area postrema</td>
<td>Opioids, dopamine (D$_2$), serotonin</td>
</tr>
<tr>
<td>Chemoreceptor</td>
<td>Enkephalin,</td>
</tr>
<tr>
<td>trigger zone</td>
<td>dopamine (D$_2$), opioids</td>
</tr>
<tr>
<td>Nucleus of solitary tract</td>
<td>Enkephalin, histaminic, muscarinic, cholinergic</td>
</tr>
</tbody>
</table>
Proposed Sites of Action: *Antiemetic Drug Classes*

## Antiemetic Agents: Receptor-Site Affinity

<table>
<thead>
<tr>
<th>Pharmacologic Group/Drug</th>
<th>Dopamine (D₂)</th>
<th>Muscarinic Cholinergic</th>
<th>Histaminic</th>
<th>Serotonin (5-HT₃)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenothiazines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluphenazine</td>
<td>++++</td>
<td>+</td>
<td>++</td>
<td>–</td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>++++</td>
<td>++</td>
<td>++++</td>
<td>+</td>
</tr>
<tr>
<td>Prochlorperazine</td>
<td>+++</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butyrophenones</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Droperidol</td>
<td>++++</td>
<td>–</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>++++</td>
<td>–</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>Domperidone</td>
<td>+++</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Antihistamines</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>+</td>
<td>++</td>
<td>++++</td>
<td>–</td>
</tr>
<tr>
<td>Promethazine</td>
<td>++</td>
<td>++</td>
<td>++++</td>
<td>–</td>
</tr>
<tr>
<td>Anticholinergic</td>
<td>+</td>
<td>++++</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>Scopolamine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzamides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>+++</td>
<td>–</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>5-HT₃-receptor antagonists</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ondansetron</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>++++</td>
</tr>
<tr>
<td>Granisetron</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>++++</td>
</tr>
<tr>
<td>Tricyclic antidepressants</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amitriptyline</td>
<td>+++</td>
<td>+++</td>
<td>++++</td>
<td>–</td>
</tr>
<tr>
<td>Nortriptyline</td>
<td>+++</td>
<td>++</td>
<td>+++</td>
<td>–</td>
</tr>
</tbody>
</table>

Number of positive signs (+) indicates degree of activity; negative sign (–) indicates no activity.

Adapted from Watcha MF, White PF. Anesthesiology. 1992;77:162-184.
Medical Consequences of PONV

- Patient discomfort
- Wound dehiscence
- Electrolyte imbalance and dehydration
- Interruption in or delay of oral drug therapy, fluid intake, or eating
- Aspiration of vomit

Andrews PL. Br J Anaesth. 1992;69 (suppl 1): 2S-19S.
Sources of Direct and Indirect Costs Associated with PONV

- Cost to Surgery Center
  - Nursing labor costs for extra PACU time
  - Personnel time for emesis management
  - Drugs and supplies
  - Revenue lost as a result of extended PACU stay
- Cost to Patient
  - Charges for extra PACU time
  - Drug and supply charges
  - Hospitalization charges
  - Lost wages of patient/caretaker and/or caretaker compensation expense

Surgical Patients’ Perspective – Does PONV Affect Patient Satisfaction?

Patient Satisfaction with their anesthesia experience – VAS scores at 24 hours post surgery (rescued versus not rescued for PONV – values are means)

<table>
<thead>
<tr>
<th>Not satisfied at all</th>
<th>0</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>No need for rescue antiemetic</td>
<td>88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rescue antiemetic administered</td>
<td>75</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Who Should Receive Prophylaxis Therapy?
Your HMO covered the operation, but you'll have to get one of those little luggage locks on your own.
Ondansetron: *PONV Indications*

- Prevention of PONV
  - As with other antiemetics, routine prophylaxis is not recommended for patients in whom there is little expectation that PONV will occur
  - In patients where PONV must be avoided, Ondansetron is recommended even where the incidence of PONV is low
- Prevention of further episodes of PONV

PONV Prophylaxis is Cost Effective

Median total cost per patient*

$16.44

$0.63

$0.51

$51.20

Ponsetron 4 mg

Droperidol 0.625 mg

Droperidol 1.25 mg

Placebo

P = 0.001, active treatment groups vs placebo.

*Includes cost for drug acquisition, materials, personnel time, PACU delay, and hospital admission.

Simplified Risk Scoring

- Four predictors
  - Female gender
  - History of motion sickness/PONV
  - Nonsmoking
  - Use of postoperative opioids

- Incidence of PONV
  - 0 -10%
  - 1 -21%
  - 2 -39%
  - 3 -61%
  - 4 -79%

<table>
<thead>
<tr>
<th>Factors</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous PONV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motion sickness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration &gt; 60 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonsmoker</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Risks (%)

- Female: 17%
- Previous PONV: 18%
- Motion sickness: 42%
- Duration > 60 minutes: 54%
- Nonsmoker: 74%
- Non-smoker: 87%

Prophylactic Antiemetic Intervention Assessment Scale

3 Points Each
- History of PONV
- History of motion sickness
- Gynecological laparoscopy
- Breast reconstruction

2 Points Each
- Facelift surgery
- Strabismus or middle-ear surgery
- Neurosurgery
- Obesity

3 or More Points
Prophylactic Antiemetic is Indicated

1 Point Each
- Preadolescent
- Female
- Anxiety
- Laparoscopic cholecystectomy
- Intraoperative or postoperative opioid
- Duration of anesthesia > 60 minutes
Surgical Prophylactic Antiemetic Intervention Assessment Tool

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

**Prophylactic Antiemetic Recommended**

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

Based upon individual or a combination of patient factors, surgical procedures and/or other contributing risk factors outlined below, a prophylactic antiemetic may be appropriate. Multiple selections in each category may be made.

There are many factors that influence the incidence of postoperative nausea and vomiting (PONV). Some factors are associated with significantly greater risks than others. Based on a number of studies that stratify these factors and subject them to logistic regression analysis, an assessment scale for prophylactic antiemetic intervention is presented. Note, however, that prophylactic antiemetic intervention is advisable for any patient in whom nausea postoperatively could compromise recovery. The opinions expressed are those of Dr. T.J. Gan and do not necessarily reflect those of GlaxoSmithKline.

T.J. Gan, MB, FFCA
Department of Anesthesiology
Duke University Medical Center

A Risk Score to Predict the Probability of Postoperative Vomiting in Adults

• PONV Risk (probability) = \[ \frac{1}{1 + e^{-Z}} \]

Where Z = (no = 0, yes = 1)
+ 1.28*(female gender)
- 0.029*(age)
- 0.74*(smoking)
+ 0.63*(history of motion sickness or PONV)
+ 0.26*(duration)
- 0.92

Creating a Prevention /Treatment Algorithm

- Risks of PONV may be calculated...

\[ P = \frac{1}{1 + e^{-\text{logit}(p)}} \]

\[ \text{logit}(p) = -5.97 - 0.014 \times \text{[age]} - 1.03 \times \text{[female]} - 0.4291 \times \text{[non-smoker]} + 1.14 \times \text{[previous PONV]} + 0.46 \]

\[ + \frac{\text{[duration of surgery]}}{30} + 2.36 + 1.48 \times \text{[ENT surgery]} + \ldots \ldots \ldots \]

What Are Our Options?
PONV: *Multimodal Approaches*

- Antiemetic drugs
  - Anticholinergics
  - Benzodiazepines
  - Phenothiazines
  - Butyrophenones
  - Benzamides
  - Ephedrine
  - 5-HT$_3$-receptor antagonists
  - Antihistamines
  - Steroids

## Classification of Antiemetic Agents

<table>
<thead>
<tr>
<th>Class</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenothiazines</td>
<td>Chlorpromazine</td>
</tr>
<tr>
<td></td>
<td>Prochlorperazine</td>
</tr>
<tr>
<td>Butyrophenones</td>
<td>Droperidol</td>
</tr>
<tr>
<td></td>
<td>Haloperidol</td>
</tr>
<tr>
<td>Benzamides</td>
<td>Metoclopramide</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>Scopolamine</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>Hydroxyzine</td>
</tr>
<tr>
<td></td>
<td>Dimenhydrinate</td>
</tr>
<tr>
<td>5-HT&lt;sub&gt;3&lt;/sub&gt;-receptor</td>
<td>Ondansetron</td>
</tr>
<tr>
<td>antagonists</td>
<td>Dolasetron</td>
</tr>
</tbody>
</table>

**Watcha MF, White PF. Anesthesiology. 1992;77:162-184.**
# Antiemetics: Associated Side Effects by Class

<table>
<thead>
<tr>
<th>Class</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenothiazines</td>
<td>Sedation, hypotension, extrapyramidal reactions, dry mouth, urinary retention, tachycardia, NMS</td>
</tr>
<tr>
<td>Butyrophenones</td>
<td>Sedation, dystonic reactions, hypotension, tachycardia, extrapyramidal reactions, anxiety, restlessness, NMS</td>
</tr>
<tr>
<td>Benzamides</td>
<td>Drowsiness, restlessness, fatigue, anxiety, extrapyramidal reactions, NMS</td>
</tr>
<tr>
<td>Anticholinergics</td>
<td>Sedation, dry mouth, visual disturbances, memory loss, confusion, hallucinations, urinary retention</td>
</tr>
<tr>
<td>Antihistamines</td>
<td>Sedation, blurred vision, dry mouth, urinary retention, tachycardia</td>
</tr>
<tr>
<td>5-HT&lt;sub&gt;3&lt;/sub&gt;-receptor antagonists</td>
<td>Headache, dizziness, mild drowsiness, constipation, arrhythmias (rare)</td>
</tr>
</tbody>
</table>

TransDermalScopolamine
# Pharmacokinetics of Transdermal Scopolamine

<table>
<thead>
<tr>
<th>Pharmacokinetcs</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Absorption</strong></td>
<td>Reaches therapeutic levels at 4 hours</td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>Crosses placenta and blood-brain barrier</td>
</tr>
<tr>
<td><strong>Metabolism</strong></td>
<td>Extensively metabolized</td>
</tr>
<tr>
<td><strong>Excretion</strong></td>
<td>Half-life 9.5 h after patch removal</td>
</tr>
<tr>
<td><strong>Drug Interactions</strong></td>
<td>Potential drug interactions</td>
</tr>
<tr>
<td></td>
<td>– Additive CNS effects with sedatives, tranquilizers, alcohol</td>
</tr>
<tr>
<td></td>
<td>– Additive anticholinergic effects with antihistamines, TCAs, muscle relaxants</td>
</tr>
<tr>
<td></td>
<td>– Decreased absorption of oral drugs</td>
</tr>
</tbody>
</table>

Transdermal scopolamine prescribing information.
### Transdermal Scopolamine (0-24hr)

<table>
<thead>
<tr>
<th>Outcome</th>
<th># Trials</th>
<th># Active/placebo</th>
<th>NNT/ [Harm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>15</td>
<td>790/793</td>
<td>5.6</td>
</tr>
<tr>
<td>Nausea</td>
<td>13</td>
<td>608/604</td>
<td>4.3</td>
</tr>
<tr>
<td>PONV</td>
<td>20</td>
<td>928/929</td>
<td>3.8</td>
</tr>
<tr>
<td>Rescue</td>
<td>10</td>
<td>626/632</td>
<td>11.1</td>
</tr>
</tbody>
</table>

Safety Profile

- Adverse events were generally mild.
- In 5 clinical studies (n=461), the most frequently reported adverse events were dry mouth (29%) and dizziness (12%).
Contraindications

• If hypersensitive to:
  – Scopolamine
  – Other belladonna alkaloids
  – Any ingredient/component of formulation/delivery system

• Angle-closure glaucoma
Droperidol
FDA Warnings About Droperidol

• Cases of QT prolongation and/or torsades de pointes have been reported in patients receiving droperidol at or below recommended doses
Cases of QT prolongation and serious arrhythmias (e.g., torsades de pointes) have been reported in patients treated with INAPSINE. Based on these reports, all patients should undergo a 12-lead ECG prior to administration of INAPSINE to determine if a prolonged QT interval (i.e., QTc greater than 440 msec for males or 450 msec for females) is present. If there is a prolonged QT interval, INAPSINE should NOT be administered. For patients in whom the potential benefit of INAPSINE treatment is felt to outweigh the risks of potentially serious arrhythmias, ECG monitoring should be performed prior to treatment and continued for 2-3 hours after completing treatment to monitor for arrhythmias.
PONV Admissions

NAUSEA AND VOMITING: OTHER OPTIONS

• Alcohol swab
• Ginger root
• Natural vitamins
• TENS
• Hypnosis
What About Q-T Interval Problems With The 5-HT₃ Antagonists?
## Cardiovascular Adverse Effects with Ondansetron & Dolasetron

Mean change from baseline in ECG parameters (n=609)

<table>
<thead>
<tr>
<th>ECG Parameter</th>
<th>Dolasetron 1.8 mg/kg</th>
<th>Dolasetron 2.4 mg/kg</th>
<th>Ondansetron 32 mg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2h</td>
<td>24h</td>
<td>1-2h</td>
</tr>
<tr>
<td>PR (msec)</td>
<td>13.9</td>
<td>3.6</td>
<td>15.0</td>
</tr>
<tr>
<td>QRS (msec)</td>
<td>6.3</td>
<td>1.4</td>
<td>8.0</td>
</tr>
<tr>
<td>QT (msec)</td>
<td>9.6</td>
<td>-1.3</td>
<td>11.4</td>
</tr>
<tr>
<td>QTc (msec)</td>
<td>15.0</td>
<td>0.9</td>
<td>18.2</td>
</tr>
<tr>
<td>JT (msec)</td>
<td>3.3</td>
<td>-2.8</td>
<td>3.4</td>
</tr>
<tr>
<td>HR (bpm)</td>
<td>1.5</td>
<td>1.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Efficacy of Ondansetron Plus Dexamethasone IV Compared with Ondansetron Alone In Gynecological Surgery

• Muscle relaxation with vecuronium; reversed with glycopyrrolate and neostigmine combination
• Two study groups:
  – ondansetron injection 4 mg plus placebo
  – ondansetron injection 4 mg plus dexamethasone 8 mg IV

## Efficacy of Ondansetron Plus Dexamethasone IV Compared with Ondansetron Alone In Gynecological Surgery

<table>
<thead>
<tr>
<th></th>
<th>ondan. 4 mg and Placebo</th>
<th>ondan. 4 mg and Dexamethasone 8 mg</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All patients</strong></td>
<td>n = 89</td>
<td>n = 91</td>
<td></td>
</tr>
<tr>
<td>Complete response (%)</td>
<td>38</td>
<td>52</td>
<td>.048</td>
</tr>
<tr>
<td>0 emetic episodes (%)</td>
<td>66</td>
<td>85</td>
<td>.003</td>
</tr>
<tr>
<td><strong>Thiamylal-induced subset</strong></td>
<td>n = 76</td>
<td>n = 81</td>
<td></td>
</tr>
<tr>
<td>Complete response (%)</td>
<td>39</td>
<td>48</td>
<td>.175</td>
</tr>
<tr>
<td>0 emetic episodes (%)</td>
<td>67</td>
<td>84</td>
<td>.011</td>
</tr>
<tr>
<td><strong>Propofol-induced subset</strong></td>
<td>n = 13</td>
<td>n = 10</td>
<td></td>
</tr>
<tr>
<td>Complete response (%)</td>
<td>31</td>
<td>80</td>
<td>.026</td>
</tr>
<tr>
<td>0 emetic episodes (%)</td>
<td>62</td>
<td>90</td>
<td>.14</td>
</tr>
</tbody>
</table>

Complete response: no emesis and no rescue medication administered.

Antiemetic Timing
Timing of Antiemetics

• Antiemetic prophylaxis always has higher efficacy than treatment/rescue
• Timing is a crucial and controversial issue
PONV: Timing of Antiemetic Administration

• Options
  – Prior to induction
  – Prior to narcotic dose
  – Near the end of operation
  – Rescue
Antiemetic Dosing: *Timing*

- Potential questions
  - Outpatient vs inpatient
  - Short vs long procedure
  - Split dosing
  - Repeat dosing
Timing of Ondansetron Administration

- Randomized, double-blind, placebo-controlled design
- Patient population
  - N = 164 women with ASA physical status I or II
  - Scheduled for outpatient laparoscopic procedures
- Randomized to 1 of 4 groups
  - Group A: placebo 2-3 minutes before anesthesia and at end of surgery
  - Group B: ondansetron 2 mg before and after surgery
  - Group C: ondansetron 4 mg before surgery and placebo after surgery
  - Group D: placebo before surgery and ondansetron 4 mg after surgery
- Primary endpoint
- Complete response to prophylactic antiemetic medication

Complete Response at 24-Hours Post-Surgery

Dosage and Administration

Pediatrics (2-12 years): 0.1 mg/kg IV, up to 40 kg

Adults: 4 mg IV or 4 mg IM
  IV administration should be done slowly, over not less than 30 seconds, but preferably over 2-5 minutes

ODT
  - Adult: 16 mg one hour pre-induction
How Often Should We Repeat-Dose Our Antiemetic?
## Duration of Antiemetic Effects of Ondanستهترون

### Patients Without Emesis or Rescue Antiemetic (%)

<table>
<thead>
<tr>
<th>Time After Administration</th>
<th>Placebo (n = 129)</th>
<th>1 mg* (n = 130)</th>
<th>4 mg* (n = 119)</th>
<th>8 mg* (n = 122)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 minutes</td>
<td>68</td>
<td>78</td>
<td>85</td>
<td>87</td>
</tr>
<tr>
<td>60 minutes</td>
<td>48</td>
<td>65</td>
<td>74</td>
<td>70</td>
</tr>
<tr>
<td>90 minutes</td>
<td>38</td>
<td>60</td>
<td>66</td>
<td>63</td>
</tr>
<tr>
<td>120 minutes</td>
<td>30</td>
<td>57</td>
<td>62</td>
<td>58</td>
</tr>
<tr>
<td>24 hours</td>
<td>15</td>
<td>41</td>
<td>49</td>
<td>47</td>
</tr>
</tbody>
</table>

The Great Unknown: Postdischarge *PONV*
The Great Unknown: *Post-discharge PONV*

- Trend: ever-increasing number of ASC, office-based anesthesia, and outpatient surgeries
- One study: PONV 48 hours after discharge = 16.8% compared with incidence in PACU (9.8%)
- Numbers may even be higher (30%)

PACU = post anesthesia care unit.

Your “Street Ready” Patient Suddenly Becomes “Ill”

What Are Your Choices?
An instant later, both Professor Waxman and his time machine are obliterated, leaving the cold-blooded/warm-blooded dinosaur debate still unresolved.
"Whoa! Is that a needle, Doc? 'Cause Zack don't like needles."
Zofran ODT® Orally
Disintegrating Tablets: Clinical Information and Stability Data
ODT for Post Discharge Nausea and Emesis

- 60 patients undergoing gynecological laparoscopy
- Anesthesia:
  - Premedication: midazolam and fentanyl
  - Induction: propofol
  - Maintenance: isoflurane
- All patients received ondansetron 4 mg IV at induction
- Post-discharge patients randomized to either:
  - ODT 8 mg b.i.d. for 24 hours
  - Placebo

Gan TJ et al. 2000 Meeting of the ASA; San Francisco, Calif. Abstract #A-34.
# ODT for Post-Discharge Nausea and Emesis Results at 24 Hours

<table>
<thead>
<tr>
<th></th>
<th>Zofran ODT</th>
<th>Placebo</th>
<th>(P) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incidence of emesis</td>
<td>3%</td>
<td>23%</td>
<td>.02</td>
</tr>
<tr>
<td>Incidence of nausea</td>
<td>30%</td>
<td>50%</td>
<td>.11</td>
</tr>
<tr>
<td>Severity of nausea (VAS)</td>
<td>1.6 ± 2.8</td>
<td>3.8 ± 4.6</td>
<td>.03</td>
</tr>
<tr>
<td>Patient satisfaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfied</td>
<td>90%</td>
<td>63%</td>
<td>.03</td>
</tr>
<tr>
<td>Neither satisfied nor dissatisfied</td>
<td>3%</td>
<td>3%</td>
<td>–</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>7%</td>
<td>34%</td>
<td>–</td>
</tr>
</tbody>
</table>

VAS = visual analogue scale.

Gan TJ et al. 2000 Meeting of the ASA; San Francisco, Calif. Abstract #A-34.
PONV: *Ideas*

- Multi-modal drug therapy
- Volume replacement
- Anesthetic choice
- Postoperative pain relief
- Combined anesthetic technique
- Patient training
INFORMATION EXPLOSION
It is important to remember that in spite of our best efforts, both pharmacologically, as well as in our technique, there is a patient population that will experience post operative nausea, and/or vomiting. A part of this group will also be refractory to any and all efforts on our part to alleviate their symptoms.
“There are very few people who don’t become more interesting when they stop talking.”

Mary Lowry