Postoperative Nausea & Vomiting (PONV)

Why do we care about PONV?
- Up to 1/3 of patients without prophylaxis will experience PONV (up to 70-80% among high-risk patients).
- Causes patient discomfort
- Prolonged PACU stay
- A leading cause of unanticipated hospital admission
- Possible aspiration risk
- Patients report avoidance of PONV as a greater concern than postoperative pain (willing to pay $56-100 out-of-pocket for effective PONV control).

Major Risk Factors

Patient-Related
- History of PONV or motion sickness
- Female > male
- Young > old
- Non-smoker

Anesthetic-Related
- N₂O, volatile anesthetics
- Drugs (narcotics, neostigmine)
- Aggressive hydration (gut edema)

Surgery-Related
- Duration of surgery - every 30 minutes increases risk by 60% above baseline (e.g. 10% → 16% after 30 minutes)
- Type of surgery (laparoscopic, ENT, neuro, breast, plastics, strabismus)

Chemoreceptor Trigger Zone
### Antiemetic Classes

#### 5-HT₃ Antagonists (e.g. Ondansetron, Granisetron)
- Serotonin receptor antagonist
- More effective at preventing emesis than nausea
- All agents equally effective
- Zofran 4-8 mg IV or Kytril 0.1-1 mg IV before end of case

#### Steroids
- Cheap and effective
- Can be given anytime, for prolonged PONV relief
- Avoid in diabetics
- Decadron 4-10 mg IV anytime during case

#### Gastrokinetic (e.g. Metoclopramide)
- Dopamine antagonist; can cause extrapyramidal SEs
- Increases GI motility and LES tone
- Reglan 20 mg IV before end of case

#### Other Antiemetic Agents

#### Vasopressors
- Ephedrine 50 mg IM
  - Prevents gut hypoperfusion

#### Induction agents
- Propofol 10-20 mg IV bolus

#### Antihistamines (H₂-blockers)
- Cimetidine 300 mg IV
- Ranitidine 50 mg IV

### IMPACT Trial: Study Design

(Apfel et al., 2004)

5161 patients, 6 treatments (2⁶ = 64 treatment groups)

<table>
<thead>
<tr>
<th>Randomization</th>
<th>Remifentanil gtt</th>
<th>Fentanyl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induction &amp; Intubation</td>
<td>30% O₂ + N₂</td>
<td>30% O₂ + N₂O</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Volatile Anesthetic</td>
<td>Propofol gtt</td>
</tr>
<tr>
<td>20 minutes after start</td>
<td>+/- Dexamethasone 4 mg</td>
<td></td>
</tr>
<tr>
<td>20 minutes before end</td>
<td>+/- Droperidol 1.25 mg</td>
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<tr>
<td>+/- Ondansetron 4 mg</td>
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</table>
IMPACT Trial: Results
(Apfel et al., 2004)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>RR Reduction</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dexamethasone (vs. none)</td>
<td>26.4%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ondanestron (vs. none)</td>
<td>26.0%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Droperidol (vs. none)</td>
<td>24.5%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Nitrogen carrier (vs. N₂O)</td>
<td>12.1%</td>
<td>0.003</td>
</tr>
<tr>
<td>Propofol gtt (vs. volatiles)</td>
<td>18.9%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Remifentanil gtt (vs. fentanyl)</td>
<td>-5.2%</td>
<td>0.21</td>
</tr>
</tbody>
</table>

- Interventions acted independently of each other; relative risk reduction (RRR) of combined therapy can be estimated by multiplying individual RRRs.
- Average PONV = 34% (59% with volatile + N₂O + remi + no antiemetics; 17% with propofol + N₂ + fentanyl + antiemetics x3).
- Use the safest and cheapest antiemetic first; use combined therapy only in moderate or high-risk patients.

Algorithm for PONV Treatment

Strategies to Reduce PONV

- Use regional anesthesia vs. GA
- Use propofol for induction and maintenance of anesthesia
- Use intraoperative supplemental O₂ (50-80%)
- Avoid N₂O and/or volatile anesthetics
- Minimize opioids
- Minimize (<2.5 mg) or eliminate neostigmine
- Maintain euvoeuma; avoid hypervolemia (gut edema)
- Use a combination of antiemetics in different classes

References