Fourth Consensus Guidelines for Management of PONV; International

Tricia Meyer
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Fourth Consensus Guidelines for the Management of Postoperative Nausea and Vomiting

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Endorsed by 23 professional organizations
<table>
<thead>
<tr>
<th>American Society for Enhanced Recovery</th>
<th>Japanese Society of Anesthesiologists</th>
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<tbody>
<tr>
<td>American Society of Health Systems Pharmacists</td>
<td>Korean Society of Anesthesiologists</td>
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<tr>
<td>American Society of Peri Anesthesia Nurses</td>
<td>Perioperative Care Practice and Research Network</td>
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<tr>
<td>American Society of Anesthesiologists</td>
<td>Malaysian Society of Anesthesiologists</td>
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<td>American Academy of Anesthesiologist Assistants</td>
<td>Royal College of Anesthesiologist Thailand</td>
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<td>American Association of Nurse Anesthetists</td>
<td>Singapore Society of Anesthesiologists</td>
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<tr>
<td>American College of Clinical Pharmacy</td>
<td>Society for Ambulatory Anesthesia</td>
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<td>Australian Society of Anesthetists</td>
<td>Society for Pediatric Anesthesia</td>
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<td>Brazilian Society of Anesthesiology</td>
<td>Society of American Gastrointestinal &amp; Endoscopic Surgeons</td>
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<td>Chinese Society of Anesthesiology</td>
<td>South African Society of Anesthesiologists</td>
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<tr>
<td>European Society of Anesthesiologists</td>
<td>Taiwan Society of Anesthesiologists</td>
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Purpose

The current guideline was developed to provide perioperative practitioners with a comprehensive and up-to-date, evidence-based guidance on the risk stratification, prevention, and treatment of PONV in both adults and children. The guideline also provides guidance on the management of PONV within enhanced recovery pathways.
Global volume of surgery: 300 million+/yr
51.4 million inpatient procedures
20.9% of hospital stays involve operating room (OR) procedures and are 48% of hospital costs
20 most common procedures account for > half OR procedures
Hospital stays involving OR are 2.5X more costly
60-70% of hospital revenues tied to OR
OR charges range from $22-$133+++/min (exclude extra resources, surgeon’s and anesthesiologist’s fees)
Patients Desire an Absence of PONV

Relative Importance of Patient Postoperative Recovery Concerns (%)
(N=220)¹

- PONV: 49%
- Pain: 27%
- Alertness: 13%
- Additional cost: 11%

PONV

- The most common reason for poor patient satisfaction during the perioperative period²
- A greater concern for some patients than pain, alertness, or additional cost¹,³

PONV Represents a Significant Unmet Need

PONV is a common postoperative complication affecting
• 80% of high-risk patients
• >30% of high-risk patients despite prophylaxis treatment

No single drug or class of drug is completely effective in controlling PONV since many pathways can trigger nausea and vomiting

For all patients at risk (≥1 risk factor), guidelines recommend a multimodal prophylactic regimen

Ondansetron is commonly used for PONV in prophylaxis, which limits its use for rescue treatment based on current treatment guidelines

Currently, there are limited antiemetic options available as rescue treatments for patients previously administered prophylaxis with a 5-HT₃ antagonist (alone or in combination)

Documentation of Post-operative Nausea and Vomiting in Routine Clinical Practice

- Compared incidences of PONV collected by research team with those by hospital staff.
- 560 patients passing through an interdisciplinary recovery room were included in the study.
- Of the 86 cases of PONV in the recovery room only 36 (42%) were detected by staff.
- Of the 129 cases of PONV on the ward over 24 h, only 37 (29%) were recognized by staff.
- PONV in routine clinical care is likely to be underreported.
- Patients may experience PONV after discharge from the recovery room and the assessment of PONV should cover at least 24 h post-operatively.
Guideline Process

- Systematic literature search-9000 studies published since last published guidelines -up to Oct. 2011
- Established goals for guideline
- International multidisciplinary panel
- Groups for each topic were assigned with group leaders-risk factors, efficacy of interventions for prevention & treatment, combination therapy, ERP antiemetic therapy, economics & algorithms, pediatrics
- Assessed the search results for publications pertinent to each group
- Alternate searches conducted by each group
- Assessed publication
- Graded evidence

Category A: Supportive Literature

- Randomized controlled trials report statistically significant ($P < 0.01$) differences between clinical interventions for a specified clinical outcome.

- Level 1: The literature contains multiple randomized controlled trials, and aggregated findings are supported by meta-analysis.

- Level 2: The literature contains multiple randomized controlled trials, but the number of studies is insufficient to conduct a viable meta-analysis for the purpose of these guidelines.

- Level 3: The literature contains a single randomized controlled trial.
Category B: Suggestive Literature

- Information from observational studies permits inference of beneficial or harmful relationships among clinical interventions and clinical outcomes.
- Level 1: The literature contains observational comparisons (e.g., cohort, case-control research designs) of clinical interventions or conditions and indicates statistically significant differences between clinical interventions for a specified clinical outcome.
- Level 2: The literature contains noncomparative observational studies with associative (e.g., relative risk, correlation) or descriptive statistics.
- Level 3: The literature contains case reports.
Category C: Equivocal Literature

- The literature cannot determine whether there are beneficial or harmful relationships among clinical interventions and clinical outcomes.
- Level 1: Meta-analysis did not find significant differences ($P > 0.01$) among groups or conditions.
- Level 2: The number of studies is insufficient to conduct meta-analysis, and (1) randomized controlled trials have not found significant differences among groups or conditions, or (2) randomized controlled trials report inconsistent findings.
- Level 3: Observational studies report inconsistent findings or do not permit inference of beneficial or harmful relationships.
The lack of scientific evidence in the literature is described by the following terms.

- **Inadequate**: The available literature cannot be used to assess relationships among clinical interventions and clinical outcomes. The literature either does not meet the criteria for content as defined in the “Focus” of the Guidelines or does not permit a clear interpretation of findings due to methodological concerns (e.g., confounding in study design or implementation).

- **Silent**: No identified studies address the specified relationships among interventions and outcomes.
Mrs JH is a 66yr old female, height is 5 ft., 96kg, with a history of hypertension, A Fib, Parkinson’s. Previous surgical history states she has been admitted after a day surgery case due to nausea and vomiting. She denies smoking and alcoholic beverage use. She is undergoing a bariatric procedure. Medications: levodopa, apixaban
Guideline I. Identify Patient’s risk for PONV risk factors

## Risk Factors for PONV in Adults

<table>
<thead>
<tr>
<th>Evidence</th>
<th>Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Positive Overall</strong></td>
<td>Female sex (B1)</td>
</tr>
<tr>
<td></td>
<td>History of PONV or motion sickness (B1)</td>
</tr>
<tr>
<td></td>
<td>Nonsmoking (B1)</td>
</tr>
<tr>
<td></td>
<td>Younger age (B1)</td>
</tr>
<tr>
<td></td>
<td>General versus regional anesthesia (A1)</td>
</tr>
<tr>
<td></td>
<td>Use of volatile anesthetics and nitrous oxide (A1)</td>
</tr>
<tr>
<td></td>
<td>Postoperative opioids (A1)</td>
</tr>
<tr>
<td></td>
<td>Duration of anesthesia (B1)</td>
</tr>
<tr>
<td></td>
<td>Type of surgery (cholecystectomy, laparoscopic, gynecological) (B1)</td>
</tr>
<tr>
<td><strong>Conflicting</strong></td>
<td>ASA physical status (B1)</td>
</tr>
<tr>
<td></td>
<td>Menstrual cycle (B1)</td>
</tr>
<tr>
<td></td>
<td>Level of anesthesiologist’s experience (B1)</td>
</tr>
<tr>
<td></td>
<td>Perioperative fasting (A2)</td>
</tr>
<tr>
<td><strong>Disproven or of limited clinical relevance</strong></td>
<td>BMI (B1)</td>
</tr>
<tr>
<td></td>
<td>Anxiety (B1)</td>
</tr>
<tr>
<td></td>
<td>Nasogastric tube (A1)</td>
</tr>
<tr>
<td></td>
<td>Migraine (B1)</td>
</tr>
<tr>
<td></td>
<td>Supplemental oxygen (A1)</td>
</tr>
</tbody>
</table>

Apfel Simplified Risk Score Predicts Patient Risk for PONV

Apfel Simplified risk score for Post Discharge Nausea & Vomiting in Adults

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female Gender</td>
<td>1</td>
</tr>
<tr>
<td>History of PONV</td>
<td>1</td>
</tr>
<tr>
<td>Age &lt;50</td>
<td>1</td>
</tr>
<tr>
<td>Use of opioids in PACU</td>
<td>1</td>
</tr>
<tr>
<td>Nausea in PACU</td>
<td>1</td>
</tr>
<tr>
<td>Sum of points</td>
<td>0-5</td>
</tr>
</tbody>
</table>

# Risk score in children

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgery ≥ 30 minutes</td>
<td>1</td>
</tr>
<tr>
<td>Age ≥ 3 years</td>
<td>1</td>
</tr>
<tr>
<td>Strabismus surgery</td>
<td>1</td>
</tr>
<tr>
<td>History of POV or family history of PONV</td>
<td>1</td>
</tr>
<tr>
<td>Sum of points</td>
<td>0-4</td>
</tr>
</tbody>
</table>

![Graph showing risk score distribution](image)

What are the risk factors for Mrs. J. H.?
Guideline 2. Reduce Baseline Risk

- Avoidance of GA by the use of regional anesthesia (A1)
- Use of propofol for induction and maintenance of anesthesia (A1)
- Avoidance of nitrous oxide in surgeries lasting over 1 h (A1)
- Avoidance of volatile anesthetics (A2)
- Minimization of intraoperative (A2) and postoperative opioids (A1)
- Adequate hydration (A1)
- Using sugammadex instead of neostigmine for the reversal of neuromuscular blockade (A1)
Guideline 3. Administer PONV Prophylaxis Using 2 Interventions in Adults at Risk for PONV

5-HT\textsubscript{3} receptor antagonists + dex
- Ondansetron: (A1)
- Palonosetron: (A2)
- Ramosetron: (A2)
- Granisetron: (A3)
- Tropisetron: (A3); with methylprednisolone (A3)

5-HT\textsubscript{3} receptor antagonists + aprepitant
- Ondansetron: (A2)
- Ramosetron: (A3)
- Palonosetron: (A3)

Aprepitant + dex: (A2)

5-HT\textsubscript{3} + droperidol
- Ondansetron + droperidol: (A3)
- Granisetron + droperidol: (A3)
- Palonosetron + droperidol: (A3)

Other 5-HT\textsubscript{3} combination therapies:
- Ondansetron + haloperidol: (A3)
- Haloperidol + dexamethasone + ondansetron: (A3)
- Ondansetron + betaisthine: (A2)
- Ramosetron + gabapentin: (A3)
- Midazolam + ramosetron: (A3)

Other antidopaminergic combination therapies:
- Dex+ haloperidol: (A2)
- Metoclopramide + dimenhydrinate: (A3)
- Amisulpride +1 nondopaminergic antiemetic: (A3)
- Haloperidol + midazolam: (A2)

Acupoint stimulation + pharmacoprophylaxis: (A2)

Others
- Propofol + dexamethasone: (A3)
- Dex + dimenhydrinate: (A3)
- Gabapentin + dexamethasone: (A3)

Major change is that we now recommend the use of multimodal prophylaxis in patients with one or more risk factor
Nausea and Vomiting Are Mediated by Multiple Neurotransmitters and Their Receptors

<table>
<thead>
<tr>
<th>Neurotransmitter</th>
<th>Antagonist</th>
<th>Receptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylcholine</td>
<td></td>
<td>Cholinergic muscarinic M3/M5 receptor</td>
</tr>
<tr>
<td>Dopamine</td>
<td></td>
<td>D2/D3 receptors</td>
</tr>
<tr>
<td>Histamine</td>
<td></td>
<td>H1 receptor</td>
</tr>
<tr>
<td>Serotonin</td>
<td></td>
<td>5-HT3 receptor</td>
</tr>
<tr>
<td>Substance P/NK-1</td>
<td></td>
<td>NK-1 receptor</td>
</tr>
</tbody>
</table>

D3 = dopamine-3, H1 = histamine, M3 = muscarinic 3, M5 = muscarinic 5, NK-1 = neurokinin-1.

6 Main Drug Classes Manage PONV

They are classified on the basis of their action over various receptors

- Anticholinergics
- 5-HT₃ antagonists
- Antihistamines
- NK-1 antagonists
- Dopamine antagonists
- Corticosteroids
Combination Prophylaxis in Patients at Moderate or High Risk May Reduce Incidence of PONV

<table>
<thead>
<tr>
<th>Therapy Type</th>
<th>PONV Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>No antiemetic</td>
<td>52%</td>
</tr>
<tr>
<td>Monotherapy</td>
<td>37%</td>
</tr>
<tr>
<td>Combination prophylaxis with 2 antiemetics</td>
<td>28%</td>
</tr>
<tr>
<td>Combination prophylaxis with 3 antiemetics</td>
<td>22%</td>
</tr>
</tbody>
</table>

## Antiemetic Doses & Timing for Prevention of PONV in Adults


<table>
<thead>
<tr>
<th>Drugs</th>
<th>Dose</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amisulpride</td>
<td>5 mg</td>
<td>At induction</td>
</tr>
<tr>
<td>Aprepitant</td>
<td>40 mg PO</td>
<td>Within 3 hrs prior to induction</td>
</tr>
<tr>
<td>Casopitant</td>
<td>150 mg PO</td>
<td>At induction</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>4–8 mg IV</td>
<td>At Induction</td>
</tr>
<tr>
<td>Dimenhydrinate</td>
<td>1 mg/kg IV</td>
<td>*at induction</td>
</tr>
<tr>
<td>Dolasetron</td>
<td>12.5 mg IV</td>
<td>End of surgery; timing may not affect efficacy</td>
</tr>
<tr>
<td>Droperidol</td>
<td>0.625 mg IV</td>
<td>End of surgery</td>
</tr>
<tr>
<td>Ephedrine</td>
<td>0.5 mg/kg IM</td>
<td>End of surgery</td>
</tr>
<tr>
<td>Granisetron</td>
<td>0.35–3 mg IV</td>
<td>End of surgery</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>0.5 to &lt;2 mg IM/IV</td>
<td>*at induction</td>
</tr>
<tr>
<td>Methylprednisolone</td>
<td>40 mg IV</td>
<td>*after induction</td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>10 mg</td>
<td>*at induction</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>4 mg IV 8 mg PO or ODT</td>
<td>End of surgery</td>
</tr>
<tr>
<td>Palonosetron</td>
<td>0.075 mg IV</td>
<td>10 sec. before induction</td>
</tr>
<tr>
<td>Perphenazine</td>
<td>*oral ≤8 mg</td>
<td>preop</td>
</tr>
<tr>
<td>Promethazine</td>
<td>6.25 mg</td>
<td>*(trials at induction &amp; end of )</td>
</tr>
<tr>
<td>Ramosetron</td>
<td>0.3 mg IV</td>
<td>End of surgery</td>
</tr>
<tr>
<td>Rolapitant</td>
<td>70–200 mg PO</td>
<td>At induction</td>
</tr>
<tr>
<td>Scopolamine</td>
<td>Transdermal patch</td>
<td>Prior evening or 2 h before surgery</td>
</tr>
<tr>
<td>Tropisetron</td>
<td>2 mg IV</td>
<td>End of surgery</td>
</tr>
</tbody>
</table>

*Not from consensus guidelines*
5HT-3 Receptor Antagonists

- Ondansetron 4mg similar effectiveness to dexamethasone 4-8mg & haloperidol and less effectiveness to palonosetron 0.075mg IV, aprepitant 80 mg, & fosprepitant 10mg
- Granisetron 0.35-3mg similar efficacy to other 5HT-3RA & dexamethasone 8mg & comparable to palonosetron for 24 hrs but less in the 24-48hr period.

Palonosetron- 2nd generation 5HT-3 RA, 40-hour half-life and a 5HT-3/neurokinin receptor inhibition. Similar effectiveness to apreptiant 40mg po. In meta-analysis for prevention, the drug was more effective than ondansetron 4 & 8mg, granisetron 1 mg, dex 5 & 8mg, dolasetron 12.5 mg, tropiseteron2 mg, and ramosetron 0.3mg. (A1)
NK1 Receptor Antagonists

- Aprepitant oral with a half life of 40 hrs and has been shown to be more effective in reducing POV. Has equal effect as palonosetron 0.075mg. Cochrane review suggests NK-1 monotherapy has similar efficacy to several combination therapies. NK-1 RA may be useful in high risk for PONV patients. Available as IV 150 mg for CINV as aprepitant and fosaprepitant (pro-drug to aprepitant). Fosaprepitsant is more effective than ondansetron.

- Rolipitant is a long acting NK-1RA which may be effective for PDNV (not approved) because of 180hr half life. No difference noted between rolipitant and ondansetron at 24 hrs however fewer pts had emesis at 72-120hrs.

Corticosteroids

- Dose ranges of dexamethasone are 4-10 mg with recent studies using 8 mg with positive results. A meta-analysis found no difference between 4-5 mg and the 8-10 mg dose. Dexamethasone prophylaxis resulted in comparable incidence as the 5HT-3 RA’s. Dexamethasone in a single dose has few AE’s. A Cochrane Database analysis of 37 trials shows the drug does not appear to increase risk of infections. A review of 56 trials indicated corticosteroids do not increase wound infection, bleeding or significant hyperglycemia.

- Other corticosteroids (methylprednisolone 40-125 mg doses) have similar efficacy with the exception of betamethasone

Amisulpride is the first and only antiemetic FDA-approved for PONV in patients who failed prophylaxis (10mg dose). Also approved for prophylaxis (5mg dose). The drug is a $D_2$ & $D_3$ RA. After dosing, no subject experienced QTc change from baseline greater than 30 milliseconds (40mg). Elimination half-life is 4-5 hours.

Droperidol has returned to the market although availability has been inconsistent. The panel continues to recommend 0.625mg given at end of surgery. Haloperidol doses of 0.5-2mg are effective for PONV prophylaxis.

A 2012 meta analysis shows metoclopramide 10 mg may be effective for PONV. It was more effective in combination with other antiemetics.

Antihistamines

- Meta analysis of dimenhydrinate to placebo suggested effective for PONV prophylaxis
- Diphenhydramine-50mg reduced risk of PONV but quality of recovery was not different than placebo
- Promethazine-data limited-effective for treatment with doses of 6.25mg

Anticholinergics

- Trans derm scopolamine is effective for PONV prophylaxis for 24 hrs postoperatively. Onset is 2-4 hours and can be applied pre-surgery or night before.

- Adverse events: visual disturbances, dry mouth, dizziness

Other drugs to reduce PONV

- Gabapentinoids - give 1-2 hrs before surgery 600-800mg shown to decrease PONV - 2019 FDA warning against respiratory depression when used in combo with CNS depressants - reduce intraop opioids especially in elderly

- Midazolam - Meta-analysis showed reduction in N, V, & PONV when given at induction. Limited data suggest midazolam 2 mg as effective to ondansetron 4mg when given 30 min. before end of surgery

Would you give this patient a prophylactic antiemetic (s)?

If so, what would you give the patient?
Guideline 4. Administer Prophylactic Antiemetic Therapy to children at increased risk for POV/PONV; as in adults, use of combination therapy is most effective

° In children, when risk is extremely low and surgery last < 30 minutes—may refrain from antiemetic prophylaxis
° In children, prophylaxis is recommended with increase in risk with combination therapy
° Intraoperative steroids in combination with 5-HT\textsubscript{3} RA have strongest evidence in children
2019 PONV Consensus Guidelines—should we include concerns on QT prolongation

- Risk factors related to the patient
  - Female gender
  - Electrolyte disorders (HypoK ← furosemide)
    - Acute hypocalcemia
  - Older age
  - Hypothyroidism

- Drugs that cause QT prolongation
  - Certain antibiotics
  - Certain antidepressant
  - Antipsychotic medications
  - Some antihistamines
  - Some diuretics
  - Antiarrhythmic medications
  - Some anti-emetics
Guideline 5.
Provide Antiemetic Treatment to Patients With PONV Who Did Not Receive Prophylaxis or When Prophylaxis Failed

**RESCUE:**
Receive antiemetic rescue from a different pharmacologic test

Administering repeated doses from the same class within 6 hrs does not confer additional benefit

If more than 6 hours, administer a 2\textsuperscript{nd} dose of 5HT-3 RA or butyrophenone if no other alternatives exist

**TREATMENT:**
If no prophylaxis, a 5HT-3 RA remain 1\textsuperscript{st} line

**Emerging evidence:**
NK1 RA; amisulpride 10 mg; combination therapy (ondansetron+droperidol+dexamethasone; palonosetron+dexamethasone; midazolam30mcg/kg+ondansetron); isopropyl alcohol;PC6 acupressure or PC6acupressure+ondansetron

If patient has nausea & vomiting in PACU/recovery, how would you treat?
“...there is a lack of high-quality, randomized controlled trials of postoperative nausea and vomiting treatment, with or without preceding prophylaxis...” WHY?

1. more units will be prescribed for prophylaxis than for treatment
2. clinical trials proving that an antiemetic is effective for prophylaxis rather than treatment may be more cost-effective
3. clinical trials assessing treatment need to enroll more patients than will ultimately be randomized, particularly if effective prophylaxis is given and/or lower-risk patients are included.
4. cost of closely following patients who never develop postoperative nausea and vomiting may be considerable and makes trials of old drugs even less attractive than trials of new ones
5. design of rescue treatment trials is complicated to the choice of prophylactic drugs (which should be different from the treatment drugs) and the choice of an active or inactive comparator.
Guideline 6. Ensure General Multimodal PONV Prevention and Timely Rescue Treatment Is Implemented in the Clinical Setting

- Adherence to PONV prophylaxis guidelines is low
- < 50% of medium to high risk patients receive appropriate prophylaxis
- Include high risk male patients-- should receive 3 or more antiemetics for prophylaxis
- In addition to patient risk, the strategy should take into account patient’s choice, cost effectiveness, pre-existing conditions (QT prolongations, Parkinson’s etc)
- PONV risk adapted protocols remain 35-50%

M FRANCK, FM RADTKE, CC APFEL, R KUHLY, A BAUMEYER, C BRANDT, KD WERNECKE AND CD SPIES. Documentation of Postoperative Nausea and Vomiting in Routine Clinical Practice. 2010;38:J of Int. Med Research
Guideline 7. Administer Multimodal Prophylactic Antiemetics in Enhanced Recovery Pathways

° American Society for Enhanced Recovery (ASER) released an Expert Opinion Statement that all patients should receive PONV prophylaxis. The number of medications used should be determined by the risk factors and should be of different mechanism of actions.

° Panel recommends that all ERP patients receive 2 agents for PONV prophylaxis & additional antiemetics in patients at high risk.

° Treatment or rescue should be prompt and aggressive
Summary of recommendations
Two antiemetics are now recommended for prevention in patients with 1-2 risk factors
**Pediatric POV/PONV Management Rx**

1. **RISK FACTORS**
   - Preoperative: Age ≥ 3 years, History of POV/PONV/motion sickness, Family history of POV/PONV, Post-pubertal female
   - Intraoperative: Strabismus surgery, Adenotonsillectomy, Otoplasty, Surgery ≥ 30 mins, Volatile anesthetics, Anticholinergics
   - Postoperative: Long-acting opioids

2. **RISK STRATIFICATION**
   - No Risk Factors: LOW RISK
   - 1-2 Risk Factors: MEDIUM RISK
   - ≥ 3 Risk Factors: HIGH RISK

3. **PROPHYLAXIS**
   - LOW RISK: None or 5HT3 antagonist or dexamethasone
   - MEDIUM RISK: 5HT3 antagonist + dexamethasone
   - HIGH RISK: 5HT3 antagonist + dexamethasone + consider TIVA

4. **RESCUE TREATMENT**
   - Use anti-emetic from different class than prophylactic drug - droperidol, promethazine, dimenhydrinate, metoclopramide; May also consider acupuncture/accupressure

*Consider multimodal analgesia to minimize opioid use*
° Significant research projects on amisulpride, palonosetron, and NK1 receptor antagonist & PONV management as part of ERP’s have occurred since last guidelines

° New combinations studied, however the optimal # of antiemetics, doses and exact regimen need further study

° Insufficient studies to determine choice of optimal combination therapies for treatment of PONV.

° Insufficient evidence on non-pharmacological interventions

° Need studies on risk-benefit profile of fluid therapy and PONV

° Efficacy on antiemetics influenced by gene polymorphisms

° Cost effectiveness of antiemetics and length of stay

Several of the branded/expensive drugs are in generic although the cost has not had a dramatic decrease

- Palonosetron IV, oral aprepitant, fosaprepitant IV have more studies published and are being used for PONV even with the CINV only indication
- Droperidol is available
- Major change is that we now recommend the use of multimodal prophylaxis in patients with one or more risk factor
- Aprepitant appears to be as effective as a single agent compared to combination although Cochrane analysis supports combination
- A few studies showed palonosetron alone may be as effective as in a combination although not supported by recent Cochrane analysis
- Gabapentin and midazolam have shown ability to lessen PONV rates
- Alternative modalities are showing efficacy and may need to be revisited
- Several new studies are using higher doses, such as ondansetron 8 mg, dexamethasone 8 mg, aprepitant 80mg
Call to Action