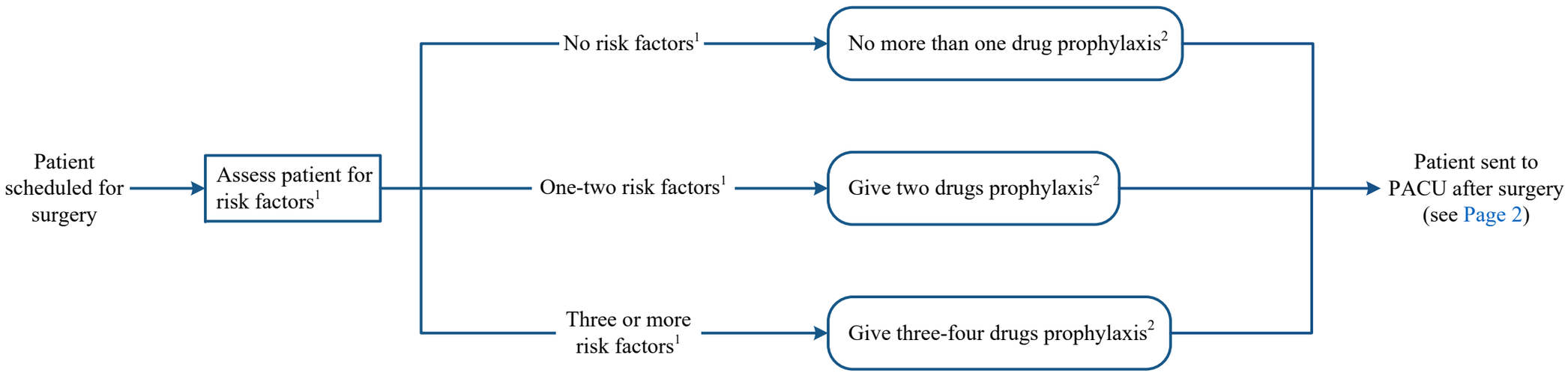
Nausea/Vomiting Associated with Surgery - Adult

Disclaimer: *This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson's specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient's care. This algorithm should not be used to treat pregnant women.*

PATIENT PRESENTATION

PROPHYLAXIS



Note: Strategies to minimize the risk of PONV:

- Minimization of perioperative opioids with the use of multimodal analgesia and regional anesthesia
- Avoidance of volatile anesthetics
- Proper intravascular hydration
- Implementation of total intravenous anesthesia
  - *Option to intraoperatively run sub-hypnotic dose of propofol 20 mcg/kg/minute*
- Avoid nitrous oxide
- Avoid neostigmine for reversal, use sugammadex

[1] MD Anderson risk factors

- **Patient specific risk factors:**
  - Female gender
  - Non-smoking status
  - History of post-operative nausea/vomiting (PONV) or motion sickness
  - Age < 50 years
- **Anesthetic risk factors:**
  - Use of volatile anesthetics
  - Post-operative opioids
- **Surgical risk factors:**
  - Duration of anesthesia > 3 hours
  - Type of surgery (abdominal, gynecologic, breast, head & neck surgery)

[2] See Appendix A – Antiemetic Medication Options for Prophylaxis

Department of Clinical Effectiveness V9
Approved by the Executive Committee of the Medical Staff on 07/15/2025

Nausea/Vomiting Associated with Surgery - Adult

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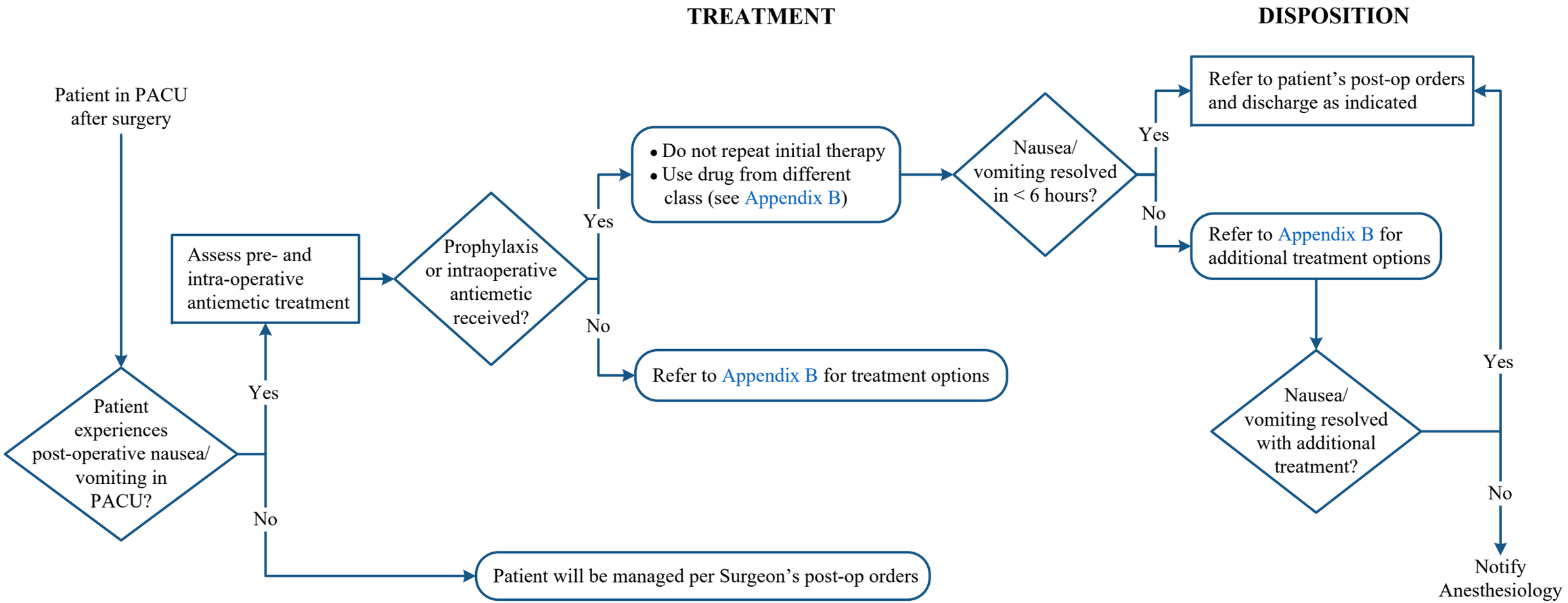

Nausea/Vomiting Associated with Surgery - Adult

APPENDIX A: Antiemetic Medication Options for Prophylaxis

Drug	Dosage	Timing	Comments
Anticholinergics Scopolamine Patch (Transderm Scop®)	1.5 mg disc placed behind ear	At least 2 - 4 hours before surgery	• Caution in patients > 60 years old • Patch may be applied the night prior to surgery • If not discontinued prior to hospital discharge, patients should be instructed in the safe removal and disposal of the patch
Benzodiazepines Midazolam (Versed®)	35 - 75 mcg/kg IV	May be given pre-operatively or intra-operatively	
Butyrophenones Droperidol (Inapsine®)[1]	0.625 mg IV	Most effective if given at the **end** of surgery	• Requires 2 - 3 hours of EKG monitoring • Known risk[2] of TdP
Haloperidol (Haldol®)	1 mg IV	Give at the **end** of surgery	• Alternative to droperidol • Known risk[2] of TdP and precludes its use as a first-line agent
Corticosteroids Dexamethasone	4 - 8 mg IV	Give shortly after **induction**	Avoid in labile diabetic patients
Dopamine Antagonist Amisulpride (Barhemsys®)	5 mg IV	Give at the time of **induction**	• Less likely to cause adverse reactions such as extrapyramidal symptoms • Conditional risk[2] of TdP

TdP = torsades de pointes

[1] Availability varies based on supply

[2] The Arizona Center for Education and Research on Therapeutics (AZCERT)'s Adverse Drug Event Causality Analysis (ADECA) Risk Categories
- Known risk: Drugs in this category prolong the QT interval and are clearly associated with a risk of TdP, even when taken as recommended
- Possible risk: Drugs in this category can cause QT prolongation but currently lack compelling evidence for a risk of TdP when the drug is taken as recommended
- Conditional risk: Drugs in this category have evidence of TdP but only under certain conditions of their use (*e.g.,* excessive dose, in patients with conditions such as hypokalemia or when they are taken with interacting drugs) or by creating conditions that facilitate or induce TdP (*e.g.,* by inhibiting metabolism of a QT-prolonging drug or by causing an electrolyte disturbance that induces and/or facilitates TdP)

Continued on next page

APPENDIX A: Antiemetic Medication Options for Prophylaxis - continued

Drug	Dosage	Timing	Comments
Neurokinin-1 Receptor Antagonists Aprepitant (Emend®)	40 mg PO	Give within 3 hours before the induction of anesthesia	
Phenothiazines Promethazine (Phenergan®)	6.25 mg IV	Give shortly after **induction**	• 6.25 mg dose may require a second dose after 15 minutes; may repeat up to 3 times for a maximum dose of 25 mg • Should not be used in children ≤ 2 years old • Possible risk[1] of TdP
Prochlorperazine (Compazine®)	5 - 10 mg IV	Give at the **end** of surgery	Risk of QTc prolongation did not reach the level to be placed in any of the TdP risk categories[1]; however, other tertiary drug information references[2] and the product information[3] indicate ECG abnormalities (Q and T wave distortions) at an undefined frequency
Serotonin (5-HT3) Antagonists Ondansetron (Zofran®)	4 mg IV	Give at the **end** of surgery	Known risk[1] of TdP
Granisetron	0.35 - 3 mg IV	Give at the **end** of surgery	• For patients with history of delayed (post-discharge) post-operative nausea and vomiting • Possible risk[1] of TdP

[1] The Arizona Center for Education and Research on Therapeutics (AZCERT)'s Adverse Drug Event Causality Analysis (ADECA) Risk Categories
- Known risk: Drugs in this category prolong the QT interval and are clearly associated with a risk of TdP, even when taken as recommended
- Possible risk: Drugs in this category can cause QT prolongation but currently lack compelling evidence for a risk of TdP when the drug is taken as recommended
- Conditional risk: Drugs in this category have evidence of TdP but only under certain conditions of their use (*e.g.,* excessive dose, in patients with conditions such as hypokalemia or when they are taken with interacting drugs) or by creating conditions that facilitate or induce TdP (*e.g.,* by inhibiting metabolism of a QT-prolonging drug or by causing an electrolyte disturbance that induces and/or facilitates TdP)

[2] See Lexicomp

[3] See prochlorperazine product information

Nausea/Vomiting Associated with Surgery - Adult

APPENDIX B: Antiemetic Medication Options for Treatment or Rescue

Drug	Dosage	Comments
Serotonin (5-HT3) Antagonists Ondansetron (Zofran®)	**First Line Agent** 4 mg IV	Known risk[1] of TdP
Phenothiazines Promethazine (Phenergan®)	**Second Line Agents** 6.25 mg IV	• 6.25 mg dose may require a second dose after 15 minutes; may repeat up to 3 times for a maximum dose of 25 mg • Possible risk[1] of TdP
Prochlorperazine (Compazine®)	5 - 10 mg IV	Risk of QTc prolongation did not reach the level to be placed in any of the TdP risk categories[1]; however, other tertiary drug information references[2] and the product information[3] indicate ECG abnormalities (Q and T wave distortions) at an undefined frequency
Butyrophenones Droperidol (Inapsine®)[4]	**Third Line Agents** 0.625 mg IV	• Requires 2 - 3 hours of EKG monitoring • Known risk[1] of TdP
Haloperidol (Haldol®)	1 mg IV	• Known risk[1] of TdP and precludes its use as a first-line agent • Alternative to droperidol
Prokinetic Metoclopramide (Reglan®)	**Rescue** 10 mg IV	Conditional risk[1] of TdP
Dopamine Antagonist Amisulpride (Barhemsys®)	**Rescue** 10 mg IV	• Less likely to cause adverse reactions such as extrapyramidal symptoms • Conditional risk[1] of TdP

Notes:

- When nausea and vomiting occurs post-operatively, treatment should be administered with an antiemetic from a DIFFERENT pharmacologic class than the drug given for prophylaxis initially
- Re-dosing should only occur if ≥ 6 hours has elapsed since the last dose from that class was given

TdP = torsades de pointes

[1] The Arizona Center for Education and Research on Therapeutics (AZCERT)'s Adverse Drug Event Causality Analysis (ADECA) Risk Categories
- Known risk: Drugs in this category prolong the QT interval and are clearly associated with a risk of TdP, even when taken as recommended
- Possible risk: Drugs in this category can cause QT prolongation but currently lack compelling evidence for a risk of TdP when the drug is taken as recommended
- Conditional risk: Drugs in this category have evidence of TdP but only under certain conditions of their use (*e.g.,* excessive dose, in patients with conditions such as hypokalemia or when they are taken with interacting drugs) or by creating conditions that facilitate or induce TdP (*e.g.,* by inhibiting metabolism of a QT-prolonging drug or by causing an electrolyte disturbance that induces and/or facilitates TdP)

[2] See Lexicomp
[3] See prochlorperazine product information
[4] Availability varies based on supply

SUGGESTED READINGS

Apfel, C. C., Kranke, P., Greim, C. A., & Roewer, N. (2001). What can be expected from risk scores for predicting postoperative nausea and vomiting? *British Journal of Anaesthesia, 86*(6), 822-827. https://doi.org/10.1093/bja/86.6.822

Bolac, C. S., Wallace, A. H., Broadwater, G., Havrilesky, L. J., & Habib, A. S. (2013). The impact of postoperative nausea and vomiting prophylaxis with dexamethasone on postoperative wound complications in patients undergoing laparotomy for endometrial cancer. *Anesthesia & Analgesia, 116*(5), 1041-1047. https://doi.org/10.1213/ANE.0b013e318276cf58

Diemunsch, P. (2008). Conference of experts--short text. Management of postoperative nausea and vomiting. French Society of Anesthesia and Resuscitation. *Annales Francaises d'Anesthesie et de Reanimation, 27*(10), 866-878. https://doi.org/10.1016/j.annfar.2008.09.004

Eberhart, L. H., & Morin, A. M. (2011). Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient: Con – "life is really simple, but we insist on making it complicated." *European Journal of Anaesthesiology, 28*(3), 155-159. https://doi.org/10.1097/EJA.0b013e3283427f4f

Gan, T. J., Belani, K. G., Bergese, S., Chung, F., Diemunsch, P., Habib, A. S., . . . Philip, B. K. (2020). Fourth consensus guidelines for the management of postoperative nausea and vomiting. *Anesthesia & Analgesia, 131*(2), 411-448. https://doi.org/10.1213/ANE.0000000000004833

Gan, T. J., Diemunsch, P., Habib, A. S., Kovac, A., Kranke, P., Meyer, T. A., . . . Tramer, M. R. (2014). Consensus guidelines for the management of postoperative nausea and vomiting. *Anesthesia & Analgesia, 118*(1), 85-113. https://doi.org/10.1213/ANE.0000000000000002

Gan, T. J., Meyer, T. A., Apfel, C. C., Chung, F., Davis, P. J., Habib, A. S., . . . Watcha, M. (2007). Society for Ambulatory Anesthesia guidelines for the management of postoperative nausea and vomiting. *Anesthesia & Analgesia, 105*(6), 1615-1628. https://doi.org/10.1213/01.ane.0000295230.55439.f4

Gómez-Arnau, J., Aguilar, J., Bovaira, P., Bustos, F., De Andrés, J., de La Pinta, J., . . . Torres, L. (2010). Postoperative nausea and vomiting and opioid-induced nausea and vomiting: Guidelines for prevention and treatment. *Revista Espanola de Anestesiologia y Reanimacion, 57*(8), 508-524. https://doi.org/10.1016/S0034-9356(10)70711-8

Kranke, P. (2011). Effective management of postoperative nausea and vomiting: Let us practice what we preach! *European Journal of Anaesthesiology, 28*(3), 152-154. https://doi.org/10.1097/EJA.0b013e3283435e51

Pierre, S. (2011). Risk scores for predicting postoperative nausea and vomiting are clinically useful tools and should be used in every patient: Pro - "Don't throw the baby out with the bathwater." *European Journal of Anaesthesiology, 28*(3), 160-163. https://doi.org/10.1097/EJA.0b013e328342fd86

Rüsch, D., Eberhart, L. H. J., Wallenborn, J., & Kranke, P. (2010). Nausea and vomiting after surgery under general anesthesia: An evidence-based review concerning risk assessment, prevention, and treatment. *Deutsches Ärzteblatt International, 107*(42), 733-741. https://doi.org/10.3238/arztebl.2010.0733

Woosley, R. L., Heise, C. W., Gallo, T., Woosley, D. and Romero, K. A., www.CredibleMeds.org, *QTdrugs List*, [March 3, 2025], AZCERT, Inc. 1457 E. Desert Garden Dr., Tucson, AZ 85718

DEVELOPMENT CREDITS

This practice consensus statement is based on majority expert opinion of the Nausea and Vomiting experts at the University of Texas MD Anderson Cancer Center for the patient population. These experts included:

Core Development Team Leads

Emily Lai, MD (Anesthesiology & Peri-operative Medicine)

Workgroup Members

Katherine Cain, PharmD (Pharmacy Clinical Programs)
Wendy Garcia, BS♦
Jacob Hall, PharmD (Pharmacy Clinical Programs)
Thoa Kazantsev, MSN, RN, OCN♦
Miguel Laxa, BSN, RN (Post Anesthesia Care Unit)
Claire Marten, PharmD (Pharmacy Clinical Programs)
Laura Michaud, PharmD (Pharmacy)
Joseph Ruiz, MD (Anesthesiology & Peri-operative Medicine)

♦Clinical Effectiveness Development Team