

Nausea and vomiting (N/V) in pediatric patients can be challenging to manage. Recognizing and managing symptoms promptly is important as electrolyte disturbance and dehydration can arise quickly in this population.¹ Determine the source of the N/V before selecting an antiemetic since some underlying causes may be reversible; it will also guide medication choice (e.g., adding a laxative for nausea from constipation).¹⁻⁶

Sources of Nausea and Vomiting:¹⁻⁶

The brain's vomiting center receives input from several areas of the brain as well as from the gastrointestinal tract, making the source of nausea and vomiting multifactorial. The four major input pathways are outlined below.¹

Pathway/Site	Receptors Involved	Trigger Examples
Chemoreceptor trigger zone (CTZ)	D ₂ , 5-HT ₃ , NK ₁	Chemotherapy, infection, and opioids
Vestibular system	M ₁ , H ₁	Motion/movement
Gastrointestinal (GI) tract	D ₂ , M ₁ , 5-HT ₃ , 5-HT ₄	Gastric stasis, obstruction, metastases, infection, chemotherapy, and radiation
Cerebral cortex	GABA	Anxiety, taste, smell, and increased intracranial pressure (ICP)

D₂=Dopamine; GABA=gamma-aminobutyric acid; H₁=Histamine; M₁=Muscarinic; NK₁=Neurokinin; 5-HT₃ & 5-HT₄=Serotonin

The onset, timing and associated symptoms of nausea and vomiting may identify possible source(s):¹

Symptom Presentation	Possible Source(s)
Onset	
Abrupt	Cholecystitis, food poisoning, gastroenteritis, pancreatitis, medications
Insidious	Reflux, gastroparesis, medications, metabolic disorders
Timing	
Before breakfast	Increased ICP, uremia
During or directly post eating	Pyloric stenosis, peptic ulcer disease, psychiatric causes
1 to 4 hours post meal	Dyspepsia, peptic ulcer disease, metastases, gastroparesis
Continuous	Conversion disorder, depression
Associated Symptoms	
Weight loss	Malignancy, gastric outlet obstructions, peptic ulcer disease
Diarrhea, myalgias, malaise, headache	Viral
Headache, stiff neck, vertigo, focal neuralgia deficits	Increased intracranial pressure (ICP), encephalitis/meningitis, head injury, brain mass, migraine
Early satiety, postprandial bloating, abdominal discomfort	Gastroparesis
Repetitive migraine headaches or irritable bowel syndrome symptoms	Cyclic vomiting syndrome
Vertigo, motion sickness	Vestibular dysfunction

Adapted from: NHPCO Pediatric Advisory Council. Pediatric E-Journal: Pain and Symptom Management in Pediatric Palliative and Hospice Care. NHPCO; 2023 Dec.¹

Nonpharmacological Management⁷

- Avoid odors the child identifies as noxious or nauseating, such as certain foods or perfumes
- Use the child's favorite scent in the room (e.g., citrus or ginger)
- Ensure good ventilation
- Encourage upright posture for 1 hour after eating
- Serve food and drinks in small and appetizing portions
- Complementary techniques such as aromatherapy or acupressure

Pharmacological Management^{1-3,7-10}

Select medications based on patient age, comorbidities, and perceived source of nausea and/or vomiting.

Medication & Dosage Forms	Suggested Dosing	Considerations
Site/Indication: Chemoreceptor Trigger Zone (CTZ) Nausea¹		
Action: 5-HT₃ Antagonism		
Ondansetron (Zofran®) – Oral tablet, 4mg, 8mg, 24mg – Orally disintegrating tablet, 4mg, 8mg, 16mg – Solution for injection, 2mg/ml – Oral solution, 4mg/5ml	Weight-based: • 0.15mg/kg PO/IV every 8 hours as needed Alternative dosing: • Age 4 to 11 yrs: 4mg every 8 hours as needed • Age ≥ 12 yrs: 8mg every 8 hours as needed Max: 16mg/dose	High antiemetic activity ² May be useful for acute gastritis
Action: D₂ Antagonism		
Chlorpromazine (Thorazine®) – Oral tablet, 10mg, 25mg, 50mg, 100mg, 200mg – Oral solution, 30mg/ml, 100mg/ml – Solution for injection, 25mg/ml	≥ 6 months of age: 0.5 to 1mg/kg PO every 4 to 6 hours as needed Max dose: • < 5 years of age: 50mg/day • 5 to 12 years of age: 75mg/day	Mild to moderate antiemetic activity ² May lower seizure threshold and extend the QT interval
Haloperidol (Haldol®) – Oral tablet, 0.5mg, 1mg, 2mg, 5mg, 10mg, 20mg – Oral solution, 2mg/ml – Oral compounded susp, 1mg/ml – Rectal compounded supp, 1mg – Solution for injection, 5mg/ml	≥3 years of age: 0.01mg/kg/dose PO/PR/IM/SQ three times daily as needed Max initial dose: 0.5mg Max dose: 0.15mg/kg/day	Mild to moderate antiemetic activity ² Useful for those with a phenothiazine (e.g., prochlorperazine, chlorpromazine) allergy or intolerance May lower seizure threshold and extend the QT interval
Prochlorperazine (Compazine®) – Oral tablet, 5mg, 10mg – Rectal suppository, 25mg – Solution for injection, 5mg/ml	PO/PR for age ≥2 years weighing > 10 kg: 0.1mg/kg every 6 to 8 hours as needed IM/IV for age ≥2 years weighing ≥ 9 kg: 0.1 to 0.15mg/kg every 8 to 12 hours as needed Max dose: 10 mg/dose	Mild to moderate antiemetic activity ² May lower seizure threshold Extrapyramidal symptoms (e.g., dystonia, akathisia) are common
Action: D₂ Antagonism/5-HT₂ Antagonism		
Olanzapine (Zyprexa®) – Oral tablet, 2.5mg, 5mg, 7.5mg, 10mg, 15mg, 20mg – Orally disintegrating tablet, 5mg, 10mg, 15mg, 20mg	3 to 17 years of age: 0.1 to 0.14mg/kg/dose rounded to the nearest 1.25 to 2.5mg increment PO daily Max dose: 10mg/dose	Mild to moderate antiemetic activity ² Chemotherapy-induced nausea prophylaxis
NOTE: The NK ₁ antagonist, aprepitant (Emend®), also manages CTZ nausea, however, has a limited role in palliative care outside of prevention of chemotherapy-included nausea and vomiting for children > 12 years of age.		

Medication & Dosage Forms		Suggested Dosing	Considerations
Site/Indication: Gastric Stasis ¹			
Action: D ₂ Antagonism (low doses)/weak 5-HT ₄ Antagonism (higher doses)			
Metoclopramide (Reglan®) – Oral tablet, 5mg, 10mg – Orally disintegrating tablet, 5mg, 10mg – Oral solution, 5mg/5ml – Oral compounded solution, 0.5mg/ml, 5mg/ml – Solution for injection, 5mg/ml	Infants, Children & Adolescents: 0.1 to 0.2mg/kg PO/IV/IM every 6 hours as needed Max dose: 0.8mg/kg/day; 10mg/dose	Moderate antiemetic activity ² Useful if gastric stasis is present Higher doses may be used for chemotherapy-induced N/V Contraindicated in complete bowel obstruction	
Site/Indication: Vestibular Nausea/Motion Sickness ¹			
Action: M ₁ Antagonism			
Scopolamine (Transderm Scop®) – 1mg/3-day transdermal patch	≥12 years of age: 1 patch topically behind the ear every 72 hours	Minimal to mild antiemetic activity ² Do not cut patches At least 12 hours is needed for effectiveness; not for acute symptoms Patches are significantly more costly than other products for this indication	
Action: H ₁ Antagonism			
Dimenhydrinate (Dramamine®) – Chewable tablet, 25mg, 50mg – Oral tablet, 50mg	≥2 years of age: 1.25mg/kg PO/PR every 6 to 8 hours as needed Max dose 2 to 5 years of age: 75mg/day Max dose 6 to 11 years of age: 150mg/day	Mild antiemetic activity ²	
Diphenhydramine (Benadryl®) – Oral tablet, 25mg – Oral capsule, 25mg, 50mg – Chewable tablet, 12.5mg, 25mg – Orally disintegrating tablet, 12.5mg, 25mg – Oral solution, 12.5mg/5ml – Solution for injection, 50mg/ml – Rectal compounded supp, 25mg	≥2 years of age: 0.5 to 1mg/kg PO/IV every 4 to 6 hours as needed Max dose: 25 to 50mg/dose	Mild antiemetic activity ²	
Meclizine (Antivert®, Bonine®) – Oral tablet, 12.5mg, 25mg – Chewable tablet, 25mg, 50mg	≥12 years of age: 12.5 to 25mg PO every 8 hours as needed	May cause sedation or constipation	
Promethazine (Phenergan®) – Oral tablet, 12.5mg, 25mg, 50mg – Oral solution, 6.25mg/5ml – Rectal suppository, 12.5mg, 25mg, 50mg – Solution for injection, 25mg/ml, 50mg/ml	≥2 years of age: 0.25 to 1mg/kg every 4 to 6 hours as needed (max initial dose: 12.5mg) Max dose: 25mg/dose	Mild antiemetic activity ² Black box warning for use in children less than 2 years of age due to respiratory depression May be useful for CTZ nausea	
Site/Indication: Cerebral Cortex: Increased ICP ¹			
Action: Corticosteroid, Anti-inflammatory			
Dexamethasone (Decadron®) – Oral tablet, 0.5mg, 0.75mg, 1mg, 1.5mg, 2mg, 4mg, 6mg – Oral liquid, 0.5mg/5ml, 1mg/1ml – Oral compounded solution, 4mg/ml – Rectal compounded supp, 4mg – Solution for injection, 4mg/ml, 10mg/ml	1-2mg/kg/day PO/PR/IV/IM in divided doses every 4 to 6 hours ⁷ Max dose: 16mg/day	Utilized for cerebral cortex nausea/increased intracranial pressure Non-specific N/V Effective as adjuvant to antiemetic therapy	

Medication & Dosage Forms	Suggested Dosing	Considerations
Site/Indication: Cerebral Cortex: Anxiety¹		
Action: GABA Agonism		
Lorazepam (Ativan®) – Oral tablet, 0.5mg, 1mg, 2mg – Oral solution, 2mg/ml – Oral compounded solution, 0.2mg/ml, 1mg/ml – Rectal compounded supp, 1mg, 2mg – Solution for injection, 2mg/ml, 4mg/ml	0.025 to 0.05mg/kg PO/SL/PR/IV/SQ every 6 hours as needed Max dose: 2mg/dose	Indirect antiemetic effect as it treats anxiety that exacerbates N/V Used for anticipatory nausea
Action: H₁ Antagonism		
Hydroxyzine (Atarax®, Vistaril®) – Oral tablet, 10mg, 25mg, 50mg – Oral solution, 10mg/5ml – Oral compounded solution, 50mg/ml	≥2 years of age: 0.5 to 1mg/kg PO every 6 hours as needed	Mild antiemetic activity ² IM dosing available but painful

Citations

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