

Introduction to Clinical Pharmacology

- Chapter 38
Upper Gastrointestinal System
Drugs



Helicobacter pylori

- Stomach bacterium that causes peptic ulcer
- Also known as *H. pylori*



Upper GI System Drugs #1

- Antacids (“against acids”) are drugs that neutralize or reduce the acidity of stomach and duodenal contents by combining with HCl and increasing the pH of the stomach acid.
- Drugs that reduce the production and release of HCl include histamine type 2 receptor (H_2) antagonists, proton pump inhibitors, and miscellaneous acid-reducing agents.

Upper GI System Drugs #2

- Proton pump inhibitors are particularly important in the treatment of *Helicobacter pylori* infection in patients with active duodenal ulcers. *H. pylori* are believed to cause a type of chronic gastritis and some peptic and duodenal ulcers as well.
- GI stimulants facilitate emptying of stomach contents into the small intestine and are used both as ulcer treatments and as antiemetics.
- Antiemetics are used to treat and prevent nausea and vomiting.



Acid Neutralizers: Antacids #1

- Actions:
 - Neutralize or reduce acidity of stomach and duodenal contents by combining with HCl and increasing the pH of the stomach acid
- Used in treatment of hyperacidity caused by:
 - Heartburn, acid indigestion, sour stomach, gastroesophageal reflux disease, peptic ulcer

Acid Neutralizers: Antacids #2

- Adverse reactions:
 - Aluminum-containing antacids: constipation, intestinal impaction, anorexia, weakness, tremors, bone pain
 - Magnesium-containing antacids: severe diarrhea, dehydration, hypermagnesemia
 - Calcium-containing antacids: rebound hyperacidity, metabolic alkalosis, hypercalcemia, vomiting, confusion, headache, renal calculi, neurologic impairment
 - Sodium bicarbonate: systemic alkalosis; rebound hyperacidity

Acid Neutralizers: Antacids #3

- Contraindications and precautions:
 - Contraindicated in patients with severe abdominal pain of unknown cause and during lactation
 - Sodium-containing antacids: contraindicated in patients with cardiovascular problems and those on sodium-restricted diets
 - Calcium-containing antacids: contraindicated in patients with renal calculi or hypercalcemia

Acid Neutralizers: Antacids #4

- Contraindications and precautions (cont.)
 - Aluminum-containing antacids: used cautiously in patients with gastric outlet obstruction, upper GI bleeding
 - Magnesium- and aluminum-containing antacids: used cautiously in patients with decreased kidney function
 - Calcium-containing antacids: used cautiously in patients with respiratory insufficiency, renal impairment, cardiac disease

Acid Neutralizers: Antacids #5

- Interactions

Interactant drug	Effect of interaction
Digoxin, isoniazid, phenytoin, and chlorpromazine	Decreased absorption of the interactant drugs results in a decreased effect of those drugs
Tetracycline	Decreased effectiveness of anti-infective
Corticosteroids	Decreased effectiveness of anti-inflammatory properties

Acid Neutralizers: Antacids #6

- Interactions (cont.)

Interactant drug	Effect of interaction
Salicylates	Pain reliever is excreted rapidly from the urine



Histamine H₂ Antagonists: Actions and Uses

- Actions:
 - Inhibit the action of histamine at H₂ receptor cells of the stomach, which then reduces the secretion of gastric acid
- Used in treatment of:
 - Heartburn, acid indigestion, sour stomach, GERD, gastric or duodenal ulcer, gastric hypersecretory conditions



Histamine H₂ Antagonists: Adverse Reactions

- Adverse reactions:
 - Dizziness, somnolence, headache
 - Confusion, hallucinations, diarrhea, and reversible impotence



Histamine H₂ Antagonists: Contraindications and Precautions

- Contraindicated in patients with known hypersensitivity to the drugs
- Used cautiously in patients with renal or hepatic impairment and in severely ill, elderly, or debilitated patients
- Cimetidine: used cautiously in patients with diabetes
- Histamine H₂ antagonists: used with caution during pregnancy and lactation



Histamine H₂ Antagonists: Interactions

Interactant drug	Effect of interaction
Antacids and metoclopramide	Decreased absorption of the H ₂ antagonists
Carmustine	Decrease in white blood cell count
Opioid analgesics	Increased risk for respiratory depression
Oral anticoagulants	Increased risk for bleeding
Digoxin	May decrease serum digoxin levels

Proton Pump Inhibitors: Actions, Uses, and Adverse Reactions

- Action: suppress gastric acid secretion by inhibition of hydrogen-potassium adenosine triphosphatase enzyme system of the gastric parietal cells
- Used in treatment of gastric and duodenal ulcers, GERD and erosive esophagitis, pathologic hypersecretory conditions
- Adverse reactions: headache, nausea, diarrhea, abdominal pain



Proton Pump Inhibitors: Contraindications and Precautions

- Contraindicated in patients:
 - Hypersensitive to any of the drugs
- Used cautiously in older adults and in patients with hepatic impairment
- Omeprazole, lansoprazole, rabeprazole, pantoprazole: contraindicated during pregnancy and lactation



Proton Pump Inhibitors: Interactions

#1

Interactant drug	Effect of interaction
Sucralfate	Decreased absorption of the proton pump inhibitor
Ketoconazole and ampicillin	Decreased absorption of the anti-infective
Oral anticoagulants	Increased risk for bleeding
Bisphosphonates	Increased risk of fracture

Proton Pump Inhibitors: Interactions

#2

Interactant drug	Effect of interaction
Digoxin	Increased absorption of digoxin
Benzodiazepines, phenytoin	Risk for toxic level of antiseizure drugs
Clarithromycin with omeprazole specifically	Risk for an increase in plasma levels of both drugs

Miscellaneous Acid Reducers

- Cholinergic blocking drugs: reduces gastric motility and decreases the amount of acid secreted by the stomach
- Pepsin inhibitor: binds with protein molecules to form a viscous substance which buffers acid and protects the mucosal lining
- Prostaglandin drug: reduces the risk of nonsteroidal anti-inflammatory drug (NSAID)-induced gastric ulcers in high risk patients

Gastrointestinal Stimulants: Actions, Uses, and Adverse Reactions

- Actions: increase the motility of the upper GI tract without increasing the production of secretions
- Used in treatment of GERD, gastric stasis
- Higher doses or prolonged administration: produce central nervous system (CNS) symptoms



Gastrointestinal Stimulants: Contraindications and Precautions

- Contraindicated in patients:
 - With known hypersensitivity to drugs, GI obstruction, gastric perforation, hemorrhage, pheochromocytoma, Parkinson disease, seizure disorder
- Used cautiously in patients:
 - With diabetes, cardiovascular disease
 - Metoclopramide: used with caution during pregnancy and lactation



Gastrointestinal Stimulants: Interactions

Interactant drug	Effect of interaction
Cholinergic blocking drugs or opioid analgesics	Decreased effectiveness of metoclopramide
Cimetidine	Decreased absorption of cimetidine
Digoxin	Decreased absorption of digoxin
Monoamine oxidase inhibitors (MAOIs)	Increased risk for hypertensive episode
Levodopa	Decreased effectiveness of metoclopramide and levodopa

Antiemetics: Actions, Uses, and Adverse Reactions

- Prevent vomiting caused by drugs, radiation, and metabolic disorders
- Reduce the non-GI adverse effects
- Tested for use in irritable bowel syndrome
- Common adverse reactions:
 - Varying degrees of drowsiness



Antiemetics: Contraindications

- Contraindicated in patients with known hypersensitivity to these drugs, with severe CNS depression
- Prochlorperazine: contraindicated in patients with bone marrow depression, blood dyscrasia, Parkinson disease, or severe liver or cardiovascular disease



Antiemetics: Precautions

- Cholinergic blocking antiemetics: used cautiously in patients with glaucoma, obstructive disease of GI or genitourinary system
- Promethazine: used cautiously in patients with hypertension, sleep apnea, or epilepsy
- 5-HT₃ receptor antagonists: used cautiously in patients with cardiac conduction problems, electrolyte imbalances



Antiemetics: Interactions

Interactant drug	Effect of interaction
CNS depressants	Increased risk for sedation
Antihistamines	Increased adverse cholinergic blocking effects
Antacids	Decreased absorption of antiemetics
Rifampin with 5-HT ₃ receptor antagonists	Decreased effectiveness of 5-HT ₃ receptor antagonists
Lithium with prochlorperazine	Increased risk for extrapyramidal effects

Emetics

- Emetics are used to empty the stomach rapidly when an individual has accidentally or intentionally ingested a poison or drug overdose.



Nursing Process: Assessment #1

- Preadministration assessment:
 - Question the patient regarding type and intensity of symptoms.
 - Document number of times the patient has vomited and approximate amount of fluid lost.
 - Take vital signs and assess for signs of fluid and electrolyte imbalances.
 - Ask about any situations of nausea or vomiting when anticipating the therapy that will occur.

Nursing Process: Assessment #2

- Ongoing assessment:
 - Monitor for continued complaints of pain, sour taste, or spitting up of blood or coffee-ground-colored emesis.
 - Monitor for signs and symptoms of electrolyte imbalance.
 - Measure and document intake and output.
 - Weigh patient with repeated episodes of vomiting daily to weekly.



Nursing Process: Diagnoses

- **Risk for Deficient Fluid Volume** related to diarrhea, nausea, and vomiting
- **Imbalanced Nutrition: Less Than Body Requirements** related to impaired ability to ingest and retain food and fluids, or offensive tastes and smells
- **Individual Effective Self-Health Management** related to inability to take oral form of medication
- **Risk for Injury** related to adverse drug effects of drowsiness

Nursing Process: Planning

- Expected outcomes:
 - Optimal response to drug therapy
 - Support of patient needs related to management of adverse reactions
 - Understanding of drug regimen



Nursing Process: Implementation #1

- Promoting an optimal response to therapy
 - Antacids: make certain adequate supply of water and cups for measuring dose are available.
 - Non-oral methods of drug administration:
 - Check to see if pill can be crushed or capsule opened.
 - Request liquid form when administration is in tube to decrease chance of problems with clogged NG tube caused by improper flushing.

Nursing Process: Implementation #2

- Promoting an optimal response to therapy (cont.)
 - Prevention of nausea in patients undergoing cancer therapy:
 - Administer the drugs before chemotherapy is given.
 - Give first dose IV during therapy; ask patient to take it orally when at home for specified time period.
 - Explain the importance of taking the drug as directed.

Nursing Process: Implementation #3

- Monitoring and managing patient needs
 - Imbalanced fluid volume:
 - Keep accurate record of fluid intake and output along with description of the diarrhea stool
 - Monitor input and output; document findings every 8 hours
 - Contact primary health care provider if signs of dehydration or electrolyte imbalance occur

Nursing Process: Implementation #4

- Monitoring and managing patient needs (cont.)
 - Imbalanced nutrition: less than body requirements:
 - Provide emesis basin; check the basin at frequent intervals; empty emesis basin; measure and document volume in the chart
 - Give damp washcloth, towel to wipe hands and face
 - Remove items with strong smells, odors



Nursing Process: Implementation #5

- Monitoring and managing patient needs (cont.)
 - Individual effective therapeutic regimen management:
 - Inform primary health care provider if patient has dislike for taste of antacid or has difficulty chewing tablet form
 - Contact primary health care provider if oral form has been ordered and patient cannot retain the drug

Nursing Process: Implementation #6

- Monitoring and managing patient needs (cont.)
 - Risk for injury
 - Instruct patient to remain in bed and provide call light for assistance
 - Observe patient receiving metoclopramide for adverse reactions related to the CNS
 - Report signs of extrapyramidal symptoms or tardive dyskinesia

Nursing Process: Implementation #7

- Educating the patient and family
 - Emphasize avoiding driving or performing other hazardous tasks due to drowsiness
 - Explain the correct method to take the drugs
 - Explain the necessity of contacting the primary health care provider immediately if any adverse symptoms occur

Nursing Process: Evaluation #1

- Therapeutic effect is achieved
- Nausea or pain is controlled
- Adverse reactions are identified, reported, and managed successfully
- No evidence of fluid volume deficit, nutritional imbalance, or electrolyte imbalance is seen



Nursing Process: Evaluation #2

- No evidence of injury is apparent
- Patient verbalizes importance of complying with prescribed treatment regimen
- Patient and family demonstrate an understanding of the drug regimen

