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Suresh Sharma

5th Edition

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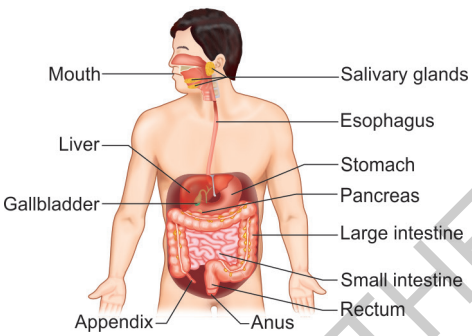
UNIT

2

Gastrointestinal Drugs

MAJOR COMPONENTS



The gastrointestinal tract comprises of the following:

- ⇨ **Hollow organs:** Mouth, esophagus, stomach, large and small intestine
- ⇨ **Solid organs:** Liver, spleen, pancreas, gallbladder
- ⇨ **Accessory organs:** Tongue, salivary glands, pancreas, liver, and gallbladder

COMMON DISEASE CONDITIONS

GERD: It is a disorder that affects the lower esophageal sphincter and leads to irritation of the food pipe lining due to the stomach acid or bile.

Diarrhea: It refers to increased urge and frequency of passing unusually watery and loose stools.

Gastroenteritis: Inflammation and infection of the gastrointestinal system resulting from bacterial toxins or viral infection and causing vomiting and diarrhea.

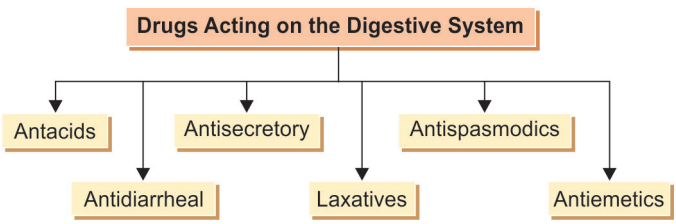
Constipation: It refers to a condition when the patient is unable to pass stool or has infrequent passage of stool.

Peptic ulcer: It is a condition in which the inner lining of the stomach, esophagus or small intestine develops a sore.

IMPORTANT PHYSIOLOGICAL CONCEPTS

Gastric acid physiology: Hydrochloric acid secretion and regulation.

THERAPEUTIC CLASSIFICATION OF DRUGS



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MNEMONIC

AuNTIes are SADESt and reLAXed



ANTI is to be prefixed with the first five alphabets of SADESt

ANTI + **S**pasmodics = **ANTIS**PASMODICS

ANTI+**A**cids = **ANTA**CIDS

ANTI + **D**iarrheal = **ANTID**IARRHEAL

ANTI + **E**metics = **ANTIE**METICS

ANTI + **S**ecretory = **ANTIS**ECRETORY

Re**LAX**ed = **LAX**atives

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CHAPTER

2.1 Antacids



PHARMACOLOGICAL OVERVIEW

General Use

These are basic substance. Neutralize acid in stomach and increase pH of gastric contents duration of action is generally 30–60 minutes when taken on empty stomach.

Nemonic for Antacid
ABC-M

A—Aluminum hydroxide
B—Bicarbonate
C—Calcium carbonate
M—Magnesium hydroxide

Classification

- **Systemic:** These are absorbed. Example—sodium bicarbonate, sodium citrate
- **Nonsystemic:** These act only in the stomach and are not absorbed in the systemic circulation.
  - Aluminum hydroxide
  - Calcium hydroxide
  - Magnesium hydroxide
  - Combination antacid preparation

Action Mechanism

They neutralize stomach acid by direct chemical reaction and inhibit pepsin, which is a proteolytic enzyme.

Nurses Responsibilities

Assessment

- Assess clients medical history, current drug list and allergies.
- Monitor intake output for urinary retention and edema with sodium bicarbonate.
- Assess for possible contraindications and cautions.
- Assess for bowel sounds to ensure GI motility.
- Monitor laboratory test results, including serum electrolyte levels and renal function tests, to monitor for adverse effects of the drug and potential alterations in excretion that may necessitate dose adjustment.
- Assess the patient for any sign of acid-base or electrolyte imbalance to ensure early detection and prompt interventions.

Potential Nursing Diagnoses

- Risk for constipation related to GI effects.
- Imbalanced nutrition: Less than body requirements related to GI effects.
- Risk for imbalanced fluid volume related to systemic effects.
- Deficient knowledge regarding drug therapy.

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Implementation

- Administer the drug apart from any other oral medications approximately 1 hour before or 2 hours after to ensure adequate absorption of the other medications.
- Have the patient chew tablets thoroughly and follow with water to ensure that therapeutic levels reach the stomach to decrease acidity.
- Obtain specimens for periodic monitoring of serum electrolytes to evaluate drug effects.
- Ensure adequate nutritional status.
- Offer support and encouragement to help the patient cope with the disease and the drug regimen.
- Provide thorough patient teaching.

PATIENT/FAMILY "MUST KNOW"??



- Drink 8 ounces of fluid after taking antacids.
- Shake suspensions well to adequately mix the ingredients before taking.
- Medications can cause constipation, water intake proper.
- Ensure strict adherence to treatment regimen.
- Do not take the medicine in case of signs of appendicitis, inflammatory bowel disease.
- Do not take medicine within 1 to 2 hours or more of taking other medicine by mouth.
- Do not take the antacid with large amounts of milk or milk products to ensure drug effectiveness.
- Antacids should be used only for occasional relief. In case there is no improvement the physician should be informed.
- The results of diagnostic tests involving use of radiopharmaceutical drugs may be affected by intake of aluminum-containing antacids.

ALUMINUM HYDROXIDE

Alugel, Alu-tab

Chemical class: Aluminum product, phosphate binding
Functional class: Antacid
Mechanism of action: Neutralizes the HCl in stomach to form aluminum chloride.
Phosphate binder: It binds with phosphate to form insoluble complexes and reduces phosphate absorption in the GI tract.
Pharmacokinetics: *Excretion*—urine

Available forms: Susp 320 mg/5 mL, 600 mg/5 mL

Indication	*Dosage/Route*	*Administering*
Antacid; hyperphosphatemia in chronic renal failure; adjunct in gastric, peptic and duodenal ulcers; hyperacidity; reflux esophagitis; heartburn; hiatal hernia stress ulcer prevention in critically ill; GERD **Unlabeled uses:** GI bleeding	**Antacid** 5–30 mL PO between meals OR HS **Hyperphosphatemia** PO 300–600 mg tid PO 50–150 mg/kg/day in 4–6 divided doses **Peptic ulcer** 5–30 mL PO between meals OR HS	2 tsp (10 mL) will neutralize 20 mEq of acid drink plenty of water following dose

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Pregnancy, breastfeeding, geriatric patient, fluid restriction, decreased GI motility, GI obstruction, dehydration, renal disease, sodium restricted diets, GI bleeding, hypokalemia heart failure, cirrhosis, edema or renal failure, hypophosphatemia

Hypersensitivity to product or aluminum products

Adverse Effects

GIT: Constipation, anorexia, obstruction, fecal impaction
Nausea, cramping, chalky taste, Milk Alkali syndrome
CNS: Coma and seizures

MTB: Hypophosphatemia, hypercalciuria, hypomagnesemia, aluminum toxicity, microlytic anemia.
MS: Osteomalacia

Drug Interactions

Decreases
Raltegravir and pazopanib conc. also decreased.
Effectiveness of—allopurinol, amprenavir, cephalosporin, corticosteroids, delavirdine, digoxin, gabapentin, gatifloxacin, H_2 antagonists, iron salts, isoniazid, ketoconazole, penicillamine, phenothiazine, phenytoin, quinidine, quinolone, tetracycline, thyroid hormones, ticlopidine, anti-cholinergic separate by at least 4–6 hr.

Drug/Food
Decrease: Product effect—high protein meal

Decrease: Phosphate interference—Tc-99m

Nursing Considerations

- Monitor the characteristics of pain—location, intensity, duration, character, aggravating and alleviating factors.
- Assess for signs of phosphate and calcium level as the product is bound in the GI system.
- Observe the signs of hypophosphatemia—anorexia, weakness, fatigue, bone pain, hyporeflexia.
- Assess use of stool softeners or laxatives and record amount and consistency of stools.
- Monitor signs of aluminum toxicity-confusion, memory loss, muscle weakness, bone pain/osteomalacia, constipation, and seizures, especially in renal impairment.
- Pregnancy/breastfeeding—occasional use is recommended. Do not administer with calcium can bind with calcium.

Patient/Family "Must Know"??



- Not to use for prolonged periods for patients with low serum phosphates or patients on low sodium diets.
- Shake liquid well.
- Stools may appear white or speckled.
- Check with prescriber after 2 weeks of self-prescribed antacid use.
- Separate from other medications by 2 hours.
- Hypophosphatemia is an adverse effect of antacids, thus patient should be asked to intake food good in phosphate.
- Notify to prescriber of black tarry stools which may be indicative of bleeding.

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CALCIUM CARBONATE

Alka Mints, Calcarb, Calcite, Caltrate, tums kids, tums lasting

Chemical class: Calcium supplement
Functional class: Antacid
Mechanism of action: It neutralizes gastric acidity.
Pharmacokinetics:

- **Peak plasma time:** 20–60 min
- **Protein bound:** 45%
- **Elimination:** Excretion—feces, unabsorbed calcium (80%), urine (20%)

Available forms: Chewable Tabs 350, 420, 450, 500, 750, 1000, 1250 mg; Gum 300, 450, 500 mg; Susp 1250 mg/5 mL; Caps 1250 mg; Powder 6.5 g/packet

Indication	*Dosage/Route*	*Administering*
DiGeorge syndrome, kidney dysfunction, pancreatitis, rheumatoid arthritis, Fanconi syndrome. Gastroesophageal reflux disease (GERD), NSAID upper gastrointestinal mucosal damage, duodenal and gastric ulcers, biliary reflux, stress gastritis exocrine pancreatic insufficiency, bile acid-mediated diarrhea, Non-ulcer dyspepsia, and urinary alkalization treating hyperphosphatemia seen in chronic kidney disease Antacid, calcium supplement, hypophosphatemia, hypertension during pregnancy, osteoporosis, hypocalcemia, hyperparathyroidism **Unlabeled uses:** Duodenal ulcer, PMS, stress gastritis	**Nutritional supplement including osteoporosis prophylaxis** >51 yr: PO 1000–1500 mg/day 19–50 yr: PO 1000 mg/day **Chronic hypocalcemia** PO 2–4 g/day PO 45–65 mg/kg/day Newborn: PO 50–150 mg/kg/day **Supplementation** <6 months: PO 210 mg/day Infants 6–12 months: PO 270 mg/day 1–3 yr: PO 500 mg/day 4–8 yr: PO 800 mg/day 9–18 yr: PO 1300 mg **Hyperphosphatemia** PO Individualized on response **Heartburn, dyspepsia, hyperacidity** 500 mg to 1000 mg and should not exceed 7 grams daily **Duodenal ulcer/ stress gastritis (Unlabeled)** PO 80–140 mEq q3–6hr **PMS (Unlabeled)** PO Chew 2 tabs bid	**PO route** • Do not give enteric coated within 1 hour of calcium carbonate • For ulcer treatment (adjunct): Give 1 and 3 hr after meals and at bedtime • For phosphate binder: Give 1 hr after each meal or snack and at bedtime • For supplement: Give 1–1 and half hour after meals; avoid oxalic foods, phytic acid or phosphorus as it may decrease calcium absorption • Suspension: Shake well; use calibrated measuring device • Laxatives or stool softeners if constipation occurs

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Pregnancy, breastfeeding, geriatric patients, fluid restriction, decreased GI motility, GI obstruction, dehydration, renal disease, hyperparathyroidism, bone tumors

Hypersensitivity, hypercalcemia. Renal calculi, hypophosphatemia, hypercalcemia, suspended digoxin toxicity.

Adverse Effects

GIT: Constipation, anorexia, nausea, vomiting, flatulence, diarrhea, xerostomia, acid rebound. hyperacidity, eructation

GU: Calculi, hypercalciuria

Do You Know

If large doses are taken for an extended time or abused: Coma, confusion, muscle twitching, pancreatitis, acute renal failure, kidney stones, headache, gall stones, bone pain can occur.

Drug Interactions

Increases

- Digoxin toxicity—hypercalcemia
- Plasma level of quinidine, amphetamines
- Hypercalcemia—thiazide diuretics, calcium supplements

Decreases: Levels of salicylates, calcium channel blockers, ketoconazole, iron salts, tetracycline, fluroquinolones, phenytoin, atenolol PO. Absorption of calcium decreased with H2 antagonists, glucocorticoids

Decrease: Phosphates
False increase: Chloride
False positive: Benzodiazepines
False decrease: Magnesium, oxalate, lipase

Nursing Considerations

Assess

- Calcium (serum, urine), calcium should be 8.5–10.5 mg/dL, urine calcium should be 150 mg/day, monitor weekly.
- Assess renal function tests before starting the medication.
- Milk-alkali syndrome—nausea, vomiting, disorientation, headache.
- Constipation; increase bulk in the diet if needed.
- Hypercalcemia—headache, nausea, vomiting, confusion.
- Hypocalcemia—paresthesia, twitching, Chvostek's sign, Trousseau's sign.
- Antacid—for abdominal pain, heartburn, indigestion before and after administration.
- Pregnancy/breastfeeding—use only if clearly needed; compatible with breastfeeding. Advice patient to limit intake of oxalate rich foods (soy, green leafy vegetables, animal protein) to avoid reduced absorption through Ca-oxalate formation.

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Patient/Family "Must Know"??



- Limit oxalate rich food, (soy; green, leafy vegetables; animal protein) to avoid reduced absorption through Ca-oxalate formation
- Increase fluid intake to 2 L unless contraindicated.
- Add bulk to diet for constipation.
- Notify prescriber for constipation.
- Not to switch antacids unless directed by the prescriber; not to use as antacids for >2 weeks without approval by prescriber.
- Avoid excessive use of alcohol, caffeine, tobacco.
- Avoid spinach, cereals, and dairy products in large amounts.

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Suresh Sharma PhD MSc (N) RN FNRS FAAN is Professor and Principal, College of Nursing, All India Institute of Medical Sciences (AIIMS), Jodhpur, Rajasthan, India. He is an RN in Board of Registered Nursing, California, USA, and a receiver of the Florence Nightingale Award (2001). He is fellow of the American Academy of Nursing, USA, and has been ICN-Global Nursing Leadership Scholar-2020 at the Global Nursing Leadership Institute, Geneva, Switzerland. He is Director, International Network of Doctoral Education in Nursing (INDEN 2022–2024), USA. He is a prolific writer and has published seven textbooks in nursing, in addition to contributing a number of chapters and more than 200 research papers published in indexed journals. He is Founder President, Society of Perioperative Nurses, India, and Society for Critical Care Nursing, India. He is also editor/section editor of several journals including Journal of Caring Science and Journal of Medical Evidence.

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