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Gastrointestinal System Drugs

Pharmacology

Antacids, antiulcer drugs, proton pump inhibitors, H2 blockers, antiemetics, laxatives, antidiarrhoeals, antispasmodics and digestive enzymes.

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CHAPTER 11 / PHARMACOLOGY 11. Gastrointestinal System Drugs

1. Introduction

Gastrointestinal medicines modify acid secretion, mucosal protection, motility, nausea pathways, pancreatic function or intestinal fluid balance. Treatment is directed towards the cause of symptoms, not simply their suppression. Persistent vomiting, haematemesis, melaena, severe abdominal pain, dysphagia, weight loss or dehydration requires clinical evaluation.

2. Antacids

Antacids neutralize gastric acid and provide relatively rapid short-term relief of acid-related symptoms. They do not eradicate Helicobacter pylori or reliably heal all ulcer disease.

Preparation	Action and adverse effects
Aluminium hydroxide	Neutralizes acid; constipation, phosphate depletion with prolonged use.
Magnesium hydroxide	Neutralizes acid; diarrhoea, hypermagnesaemia in renal impairment.
Calcium carbonate	Acid neutralization; constipation, hypercalcaemia with excessive intake.
Sodium bicarbonate	Rapid neutralization; sodium load, alkalosis and gas formation.

Antacids can bind or alter absorption of other medicines. Check separation intervals for iron, levothyroxine, tetracyclines and other drugs. Renal impairment requires careful selection.

3. Antiulcer and acid-suppressing drugs

Class	Examples / mechanism	Uses and nursing points
Proton pump inhibitors (PPIs)	Omeprazole, pantoprazole, esomeprazole; inhibit gastric H+/K+-ATPase	GERD, peptic ulcer, selected GI bleed protocols; review swallowing and timing instructions; long-term use requires indication review.
H2 receptor antagonists	Famotidine; reduces histamine-mediated acid secretion	Acid-related disease; renal dosing, possible confusion in vulnerable patients.
Mucosal protectants	Sucralfate forms protective barrier	Selected ulcer therapy; constipation, binds other medicines.
Prostaglandin analogue	Misoprostol reduces acid and supports mucosal protection	Selected NSAID-ulcer prevention; diarrhoea and uterine effects; distinct pregnancy-related indications.

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Bismuth preparations	Mucosal and antimicrobial effects	Selected H. pylori regimens; may darken stool and tongue.

PPIs are not interchangeable milligram for milligram. Many oral formulations are given before meals, but timing depends on product. Prolonged exposure may be associated with hypomagnesaemia, B12 deficiency and selected infections; assess benefit and risk rather than abruptly discontinuing needed treatment. Ranitidine has undergone safety-related regulatory restrictions in many markets; verify current local status, rather than assuming it is a routine first choice.

H. pylori infection

Eradication uses an acid suppressant plus appropriate antibiotics and sometimes bismuth. Regimens depend on resistance, prior exposure and local guidance. Encourage adherence to the prescribed course and arrange test of cure according to the clinical plan. Do not use an antibiotic casually for nonspecific gastritis.

4. Antiemetics and prokinetics

Class / example	Mechanism and uses	Adverse effects
Ondansetron	5-HT3 receptor antagonist; selected postoperative or chemotherapy nausea	Headache, constipation, QT prolongation.
Metoclopramide	Dopamine antagonism and prokinetic action; selected nausea/gastroparesis	Dystonia, restlessness, tardive dyskinesia risk; avoid prolonged inappropriate use.
Domperidone	Peripheral dopamine antagonism	QT prolongation and serious cardiac risk; review restrictions and interactions.
H1 antihistamines	Promethazine, dimenhydrinate; motion sickness and selected nausea	Sedation, anticholinergic effects; route-specific injury concerns with promethazine.
NK1 antagonists	Aprepitant; chemotherapy-associated nausea prevention	CYP interactions; use in prescribed combinations.

Metoclopramide and other dopamine-blocking antiemetics may worsen Parkinson symptoms. A mechanical bowel obstruction is a contraindication to prokinetics. Correct dehydration and assess electrolyte disturbance in persistent vomiting.

5. Laxatives

Type	Examples	Action / precautions
Bulk forming	Ispaghula (psyllium)	Increases stool bulk; adequate fluid and swallowing ability needed.
Osmotic	Lactulose, polyethylene glycol	Retains water in bowel; diarrhoea and dehydration if excessive.
Stimulant	Senna, bisacodyl	Increases motility; cramps, avoid suspected obstruction.

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Stool softener	Docusate	Facilitates stool softening; benefit varies.
Rectal preparations	Glycerol suppository, selected enemas	Local action; assess contraindications; phosphate enemas can cause severe electrolyte problems.

Lactulose also has a prescribed role in hepatic encephalopathy by reducing ammonia absorption; monitor stool frequency, hydration and mental status.

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6. Antidiarrhoeals and antispasmodics

Oral rehydration solution (ORS) replaces water and electrolytes using glucose-sodium cotransport and is central to diarrhoea management. Loperamide reduces motility and may be used in selected adults; avoid inappropriate use in bloody diarrhoea, fever with suspected invasive infection, suspected toxic megacolon or young children. Zinc is used in childhood diarrhoea according to local guideline age-specific regimens. Antibiotics are reserved for specific indications. Antispasmodics such as dicyclomine or hyoscine butylbromide may reduce smooth-muscle spasm but can cause urinary retention, constipation and anticholinergic effects. Severe unexplained pain must be investigated.

7. Digestive enzymes and other medicines

Pancrelipase supplies lipase, protease and amylase to patients with pancreatic exocrine insufficiency. Give with prescribed meals and snacks; do not crush enteric-coated preparations. Monitor stool characteristics, nutritional status and weight. Simethicone reduces surface tension of gas bubbles and may relieve selected symptoms. Ursodeoxycholic acid has specific hepatobiliary indications and is not a general digestive tonic.

8. Nursing responsibilities

Assess pain, bowel pattern, hydration, swallowing, medications and laboratory results. Verify administration relative to meals and separation from interacting medicines. Observe for bleeding, constipation, diarrhoea, extrapyramidal effects and cardiac symptoms. Educate about ORS preparation using the correct water volume, diet and warning signs; document response.

9. Examination questions

Long answer questions

1. 1. Classify antiulcer drugs with mechanisms and nursing care.
2. 2. Describe antiemetics, laxatives and antidiarrhoeal drugs.

Short answer questions

- Proton pump inhibitors; H2 blockers; ondansetron; lactulose; ORS; pancreatic enzymes.

Very short answer questions

- What enzyme do PPIs inhibit? - Gastric H+/K+-ATPase.
- One osmotic laxative? - Lactulose.
- Which antiemetic blocks 5-HT3 receptors? - Ondansetron.

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10. Quick revision

Antacids neutralize existing acid; PPIs inhibit acid production. Antiemetics act at different receptors. ORS treats fluid and electrolyte loss. Verify causes and contraindications before changing motility; monitor for GI bleeding and dehydration.

Conclusion

Gastrointestinal pharmacology requires correct selection, interaction review and monitoring of nutritional and fluid status alongside symptom relief.

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Practice questions

Choose one best answer. The answer key and explanations follow the questions.

1. How do proton pump inhibitors suppress gastric acid secretion?

A. Inhibit gastric H+/K+-ATPase
B. Neutralize acid only after it is secreted
C. Block 5-HT3 receptors
D. Stimulate intestinal opioid receptors

2. Which adverse effect is associated with magnesium hydroxide antacid?

A. Excess sodium load
B. Diarrhoea
C. Constipation
D. Phosphate depletion

3. Which antiemetic acts as a 5-HT3 receptor antagonist and can prolong the QT interval?

A. Aprepitant
B. Dimenhydrinate
C. Ondansetron
D. Metoclopramide

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Answer key and explanations

1. A - Inhibit gastric H+/K+-ATPase

PPIs inhibit the gastric proton pump.

2. B - Diarrhoea

Magnesium hydroxide can cause diarrhoea and hypermagnesaemia in renal impairment.

3. C - Ondansetron

Ondansetron blocks 5-HT3 receptors and has QT-prolongation risk.

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