

NCLEX-RN PHARMACOLOGY • RESPIRATORY SYSTEM • 2026 TEST PLAN

Antitussives, Expectorants & *Mucolytics*

The three-part cough & mucus management framework — when to suppress, when to loosen, and when to break it down. Built for clinical judgment, priority-action recall, and NCLEX trap recognition.

● ANTITUSSIVES • suppress ● EXPECTORANTS • loosen ● MUCOLYTICS • break down

At-a-Glance: Three Strategies, Three Purposes

Before the details — know when each category is appropriate. This is the #1 NCLEX conceptual trap.

Antitussives **SUPPRESS**

Silence the cough reflex.

Used for **DRY, nonproductive, exhausting** coughs that disrupt sleep or cause pain. Acts centrally (brain) or peripherally (airway receptors).

Dextromethorphan • Benzonatate • Codeine

Expectorants **LOOSEN**

Thin & mobilize secretions.

Used for **PRODUCTIVE but thick** coughs. Increases respiratory tract fluid volume so mucus is easier to cough up. Patient keeps coughing — that's the goal.

Guaifenesin

Mucolytics **BREAK DOWN**

Chemically liquefy mucus.

Used for **THICK, TENACIOUS** secretions (CF, COPD exacerbation, pneumonia). Breaks disulfide bonds in mucoproteins. Dual use for acetaminophen toxicity.

Acetylcysteine • Dornase alfa

CATEGORY 1 • CNS / PERIPHERAL ACTING

PROTOTYPE: DEXTROMETHORPHAN

Antitussives • *cough suppressants*

01 Drug Overview & Indications

- ▶ **DRY, nonproductive cough** that interferes with sleep, causes pain, or is exhausting the patient
- ▶ Post-viral upper respiratory infection with lingering cough
- ▶ Cough associated with pleuritic chest pain
- ▶ Do **NOT** use when cough is productive — suppressing helpful cough traps secretions → pneumonia

02 Mechanism of Action

- ▶ **Dextromethorphan** → suppresses cough center in medulla → ↓ cough reflex (central action)
- ▶ **Codeine** → opioid receptor binding → ↓ medullary cough center response
- ▶ **Benzonatate** → anesthetizes stretch receptors in airways & pleura (peripheral action) → ↓ afferent cough signal

03 Therapeutic Effects

- ▶ ↓ Cough frequency and severity within 15–30 min
- ▶ Improved sleep quality, ↓ fatigue
- ▶ ↓ Chest/throat pain from coughing spasms
- ▶ Working = patient rests without waking to cough

04 Side Effects & Adverse Reactions

- ▶ **Common:** drowsiness, dizziness, nausea, constipation (codeine)
- ▶ **Dextromethorphan:** serotonin syndrome if combined with SSRIs/MAOIs 
- ▶ **Codeine:** respiratory depression, constipation, dependence 
- ▶ **Benzonatate:** numbness of mouth/throat & **choking risk** if capsule chewed 
- ▶ **Abuse potential:** high-dose dextromethorphan ("robotripping") → hallucinations, dissociation

05 Priority Nursing Considerations

- ▶ → **Assess** cough character FIRST — is it productive? If yes, HOLD and notify

06 Labs & Diagnostics

- ▶ No routine labs required for short-term OTC use

- ▶ → **Monitor** respiratory rate & LOC (especially codeine)
- ▶ → **Hold** codeine if RR < 12 breaths/min
- ▶ → **Contraindicated:** dextromethorphan + MAOI (within 14 days) · codeine in children < 12
- ▶ → **Interactions:** CNS depressants (alcohol, benzos, opioids) → additive sedation

- ▶ With **codeine:** monitor pulse oximetry ($\text{SpO}_2 > 92\%$)
- ▶ Suspected serotonin syndrome → temp, CK, basic metabolic panel
- ▶ Long-term codeine → LFTs (hepatic metabolism)

07 Administration & Safety

- ▶ **Benzonatate capsules:** SWALLOW WHOLE — never chew, crush, or suck 
- ▶ Chewing releases anesthetic → oropharyngeal numbness → choking/aspiration
- ▶ Give with water, not on empty stomach for GI upset
- ▶ Codeine is a **controlled substance** (Schedule II-V depending on form)
- ▶ Keep out of reach of children — accidental benzonatate ingestion is **fatal**

08 Patient Education

- ▶ Do NOT drive or operate machinery until you know how it affects you
- ▶ Avoid alcohol & other CNS depressants
- ▶ ↑ Fluids, humidifier, honey (age > 1) for supportive care
- ▶ Seek help if: cough > 7 days, fever > 101°F, blood in sputum, SOB, rash
- ▶ Benzonatate: "Swallow like a pill — do not bite it"

09 NCLEX Test Traps ⚠

- ▶ **TRAP:** "Patient has thick green sputum with cough — which med?" Antitussive is **WRONG**. Productive cough = expectorant or mucolytic.
- ▶ **TRAP:** Benzonatate + "caplet/capsule" language. Chewing = choking emergency. First action = suction + airway.
- ▶ **TRAP:** Dextromethorphan teen abuse — OTC does NOT mean harmless.

10 Memory Boosters

- ▶ **"DM suppresses the DRUMMING"** (Dextrometh. = Dry cough Medication)
- ▶ **"Tessa-LON = Swallow-LONG, not chew"** (Benzonatate safety)
- ▶ **Antitussive = "Anti-tussis"** (Latin: tussis = cough)



Codeine ends in "-eine" like caffeine – but it
DEPRESSES, not stimulates

CATEGORY 2 • SECRETION MOBILIZER

PROTOTYPE: GUAIFENESIN

Expectorants • *loosen & mobilize*

01 Drug Overview & Indications

- ▶ **Productive cough with thick mucus** that's hard to bring up
- ▶ URI, bronchitis, sinusitis, "chest cold"
- ▶ Goal = convert an unproductive-looking but wet cough into a productive clearing cough
- ▶ OTC in most forms — often combined with antitussives in cold preparations

02 Mechanism of Action

- ▶ Guaifenesin → stimulates respiratory tract secretions → ↑ volume & ↓ viscosity of mucus → easier to expel
- ▶ Activates vagal gastric reflex → ↑ bronchial gland output
- ▶ Does **NOT** suppress cough — works WITH the cough reflex

03 Therapeutic Effects

- ▶ Thinner, looser sputum within 30 min
- ▶ ↑ Productive cough (this is GOOD — not a side effect)
- ▶ ↓ Chest congestion, ↓ post-nasal drip
- ▶ Working = patient expectorates mucus more easily

04 Side Effects & Adverse Reactions

- ▶ **Common:** nausea, vomiting (especially high doses), dizziness, headache
- ▶ Drowsiness (less than antitussives)
- ▶ Rare: rash, GI upset
- ▶ **Kidney stones** with chronic high-dose use (dehydration + metabolites)
- ▶ Generally well-tolerated → minimal serious adverse reactions

05 Priority Nursing Considerations

- ▶ → **Assess** hydration status — dry mucus without water ≠ thinnable
- ▶ → **Monitor** sputum — color, volume, consistency, ability to clear

06 Labs & Diagnostics

- ▶ No routine labs required
- ▶ Sputum culture if infection suspected (> 7 days, fever, purulent sputum)
- ▶ Chest X-ray if pneumonia is on the differential

- ▶ → **Encourage** fluids (2–3 L/day unless contraindicated) — fluid IS the mechanism
- ▶ → **Notify** if cough persists > 7 days, fever, bloody sputum
- ▶ **Contraindications:** hypersensitivity; caution in chronic cough from smoking, asthma, emphysema

- ▶ Hydration assessment: urine specific gravity, skin turgor

07 Administration & Safety

- ▶ PO — tablets, capsules, liquid, extended-release (Mucinex)
- ▶ Extended-release: do NOT crush or chew
- ▶ Take with full glass of water (8 oz minimum)
- ▶ May be given with or without food
- ▶ Not high-alert; safe in pregnancy at therapeutic doses

08 Patient Education

- ▶ **Drink lots of water** — the drug only works if you're hydrated
- ▶ Expect to cough MORE productively — that means it's working
- ▶ Use a humidifier, avoid dry air & smoke
- ▶ Deep-breathe & cough every 2 hours when awake
- ▶ Seek care if: cough > 7 days, fever, rash, bloody sputum

09 NCLEX Test Traps ⚠

- ▶ **TRAP:** "Patient reports MORE coughing after guaifenesin." This is **expected & therapeutic** — NOT an adverse reaction. Do not hold.
- ▶ **TRAP:** "Fluid restriction ordered for HF + guaifenesin." Fluids are the mechanism — notify provider; the two orders conflict.
- ▶ **TRAP:** Combo cold meds (Robitussin DM = guaifenesin + dextromethorphan) give mixed signals — know each component.

10 Memory Boosters

- ▶ **"Gua-i-FEN-esin = FENCE down the mucus WALL" → loosens thick secretions**
- ▶ **Expectorant = "Expect-a-cough" (productive!)**
- ▶ **Mucinex → "Mucus exit" — fluid is the fuel**
- ▶ **Guaifenesin + water = team • without water = useless**

CATEGORY 3 • MUCUS BOND BREAKER

PROTOTYPE: ACETYL CYSTEINE

Mucolytics • *chemically liquefy*

01 Drug Overview & Indications

- ▶ **Thick, tenacious secretions:** cystic fibrosis, COPD exacerbation, pneumonia, bronchiectasis, atelectasis
- ▶ Pre- & post-surgical respiratory care with heavy mucus burden
- ▶ **Acetylcysteine IV/PO = antidote for acetaminophen overdose** (replenishes glutathione)
- ▶ Dornase alfa = CF-specific; breaks DNA from degraded neutrophils in mucus

02 Mechanism of Action

- ▶ **Acetylcysteine** → cleaves disulfide (S-S) bonds in mucoproteins → ↓ mucus viscosity → easier clearance
- ▶ In acetaminophen tox → restores hepatic glutathione → neutralizes toxic NAPQI metabolite → prevents liver failure
- ▶ **Dornase alfa** → recombinant DNase → digests extracellular DNA in CF sputum → ↓ mucus thickness

03 Therapeutic Effects

- ▶ Liquefied, easier-to-clear sputum within minutes of nebulization
- ▶ ↓ Work of breathing, improved SpO₂, clearer breath sounds
- ▶ Acetaminophen tox: normal AST/ALT, INR at 72 hours → liver saved
- ▶ CF: improved FEV₁, ↓ exacerbations (dornase alfa)

04 Side Effects & Adverse Reactions

- ▶ **Common:** nausea, vomiting, stomatitis, rhinorrhea
- ▶ **Smells like ROTTEN EGGS** (sulfur) — often causes nausea
- ▶ **Bronchospasm** — especially in asthmatics; pretreat with bronchodilator 
- ▶ **Anaphylactoid reaction** with IV acetylcysteine (flushing, rash, hypotension, wheeze) 
- ▶ Dornase alfa: voice changes, pharyngitis, chest pain

05 Priority Nursing Considerations

- ▶ → **Assess** breath sounds & SpO₂ before and after treatment

06 Labs & Diagnostics

- ▶ **Acetaminophen level** at 4 hrs post-ingestion → plot on Rumack-Matthew nomogram

- ▶ → **Pretreat** with bronchodilator (albuterol) in patients with reactive airway disease
- ▶ → **Have suction ready** — liquefied mucus can overwhelm weak cough
- ▶ → **Monitor** for bronchospasm, hypersensitivity — stop infusion, notify, treat anaphylaxis
- ▶ → **Acetaminophen OD**: start within 8–10 hrs of ingestion for max liver protection
- ▶ **Contraindications**: hypersensitivity; caution in asthma, peptic ulcer, esophageal varices

- ▶ **LFTs** (AST, ALT) — baseline & serial; toxic if AST > 1000
- ▶ **INR / PT** — rises with hepatic injury
- ▶ ABG, SpO₂ for respiratory use
- ▶ Sputum culture & sensitivity if infection suspected

07 Administration & Safety

- ▶ **Nebulizer** 10% or 20% solution — dilute 20% 1:1 with saline
- ▶ **IV acetylcysteine** (Acetadote) for acetaminophen OD — 3-bag loading regimen
- ▶ **PO acetylcysteine** — mix with juice/cola to mask sulfur taste
- ▶ Use **glass or plastic** containers — reacts with metal & rubber
- ▶ Dornase alfa via nebulizer only — do NOT mix with other drugs
- ▶ High-alert when used for overdose — dosing is weight-based & time-sensitive

08 Patient Education

- ▶ "It will smell like rotten eggs — that's normal, it's the sulfur"
- ▶ Cough & deep-breathe after nebulization to clear loosened mucus
- ▶ Rinse mouth after treatment to reduce nausea & stomatitis
- ▶ Report wheezing, chest tightness, rash immediately
- ▶ CF: dornase alfa is daily & lifelong — keep refrigerated, protect from light

09 NCLEX Test Traps ⚠

- ▶ **TRAP**: "Rotten egg smell during neb treatment — what do you do?" → NOTHING. Expected finding. Don't stop the drug.
- ▶ **TRAP**: Acetylcysteine + asthma patient with no bronchodilator ordered

10 Memory Boosters

- ▶ **"Muco-LYTIC = muco-LIQUID"** (chemically breaks it down)
- ▶ **Acetylcysteine = "A-CYST-teine"** → CUTS the mucus & CUTS the APAP toxicity

→ Priority = notify provider BEFORE starting. Bronchospasm risk.

- ▶ **TRAP:** Acetaminophen OD — the question is often "when to treat?"
Answer: within 8–10 hrs of ingestion, regardless of symptoms, if level is on the toxic line.

- ▶ **TRAP:** Confusing acetylcysteine (mucolytic + APAP antidote) with acetylsalicylic acid (aspirin). READ the word carefully.

- ▶ "Rotten eggs & bronchospasm = Mucomyst" — always pretreat with albuterol

- ▶ APAP antidote? N-A-C → "Not A Corpse" (saves the liver)

- ▶ Dornase alfa = "DNA-se" → chews up DNA in CF mucus

Most Tested Drugs — Quick Comparison

DRUG (BRAND)	CATEGORY	KEY USE	#1 SAFETY ISSUE	NCLEX DISTINGUISHER
Dextromethorphan <i>Robitussin DM, Delsym</i>	Antitussive (central)	Dry cough, OTC	Serotonin syndrome w/ SSRIs, MAOIs	Most common OTC cough suppressant · teen abuse risk
Benzonatate <i>Tessalon Perles</i>	Antitussive (peripheral)	Dry cough in adults	Choking if chewed · fatal in children	SWALLOW WHOLE · numbs airway stretch receptors
Codeine <i>Generic / combos</i>	Antitussive (opioid)	Severe dry cough	Respiratory depression · constipation · dependence	Controlled substance · NOT for children < 12
Guaifenesin <i>Mucinex, Robitussin</i>	Expectorant	Productive cough, thick mucus	Useless without fluids · rare kidney stones	Patient SHOULD cough more · water is mandatory
Acetylcysteine <i>Mucomyst, Acetadote</i>	Mucolytic + APAP antidote	Thick mucus · acetaminophen OD	Bronchospasm · anaphylactoid IV rxn · rotten egg odor	DUAL USE · pretreat asthmatics with bronchodilator
Dornase alfa <i>Pulmozyme</i>	Mucolytic (CF-specific)	Cystic fibrosis daily therapy	Voice changes · pharyngitis · chest discomfort	CF ONLY · nebulized · refrigerate, don't mix

FINAL SECTION • MANDATORY

Clinical Judgment Snapshot

#1 PRIORITY RISK

AIRWAY COMPROMISE

Antitussives: suppressing a productive cough → retained secretions → **pneumonia / atelectasis**.

Benzonatate: chewed capsule → oropharyngeal numbness → **choking / aspiration**.

Mucolytics: **bronchospasm** in reactive airways.

The airway always wins priority in ABC framework.

WHAT HARMS PATIENT FIRST

WRONG CATEGORY

The first insult in these drugs is **category mismatch**:

- Giving an **antitussive with productive cough** traps infected mucus.
- Giving a **mucolytic to an asthmatic without a bronchodilator** triggers bronchospasm.
- Missing a **codeine RR < 12** causes opioid respiratory failure.

Always assess the cough BEFORE you pick the drug.

FIRST NURSING ACTION

ASSESS • THEN ACT

Before giving: auscultate lungs, check cough productivity, SpO₂, RR, LOC.

Bronchospasm after acetylcysteine:
STOP the neb → O₂ → call RRT → bronchodilator.

Choked on benzonatate: suction, airway, call code.

APAP OD: draw level at 4 hrs → start NAC within 8–10 hrs regardless of symptoms.

Codeine RR < 12: hold drug → stimulate → naloxone if unresponsive.

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