

04

RESPIRATORY DAY

Flashcards 22

NGN Items 5

Calculations 5

Safety Rules 5

Case Study 1

NCLEX-RN · 2026 TEST PLAN · DAY 4 OF 11

Respiratory *Pharmacology*

Twenty-two high-yield bronchodilators, anti-inflammatories, mucolytics, antitussives, and rescue agents — wired to NCJMM clinical judgment, NGN item formats, and the 2026 Pharmacological & Parenteral Therapies framework.

§ 01 The Day-4 Roster

Twenty-two agents organized by mechanism. Tap any card below to flip — front shows mechanism and priority, back shows the complete clinical-judgment dossier with NGN cue, priority question, and rationale.

01 Albuterol SABA · rescue	02 Levalbuterol SABA · R-isomer	03 Salmeterol / Formoterol LABA · BBW	04 Fluticasone / Budesonide Inhaled corticosteroid
05 Prednisone Systemic corticosteroid	06 Methylprednisolone IV Solu-Medrol · acute	07 Ipratropium SAMA · anticholinergic	08 Tiotropium LAMA · COPD daily
09 Montelukast Leukotriene antagonist · BBW	10 Theophylline Methylxanthine · narrow TI	11 Epinephrine IM Anaphylaxis rescue	12 Acetylcysteine Mucolytic + APAP antidote
13 Guaifenesin Expectorant	14 Dextromethorphan Antitussive · OTC	15 Codeine cough syrup Opioid antitussive · BBW peds	16 Benzonatate Peripheral antitussive
17 Magnesium sulfate IV Status asthmaticus adjunct	18 Omalizumab Anti-IgE biologic · BBW	19 Dornase alfa CF mucolytic	20 Diphenhydramine H1 antihistamine

21

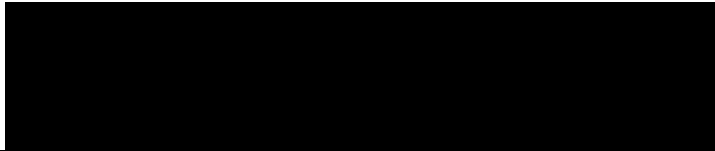
Nicotine replacement

Cessation therapy

22

Oxygen therapy

Drug-equivalent safety



§ 02

Flashcard Deck

Click any card to flip. Each back includes the full sixteen-field NCLEX dossier: assessment, labs, adverse effects, hold parameters, antidote, teaching, NGN cue, priority question with rationale, and test-taking strategy.

01 · DAY 4 RESPIRATORY

Albuterol

ProAir / Ventolin / Proventil HFA · Short-acting β_2 agonist (SABA)

EMERGENCY · RESCUE

MECHANISM · Stimulates β_2 receptors in bronchial smooth muscle → **rapid bronchodilation** within 5–15 minutes; preferential β_2 selectivity but β_1 cross-over at high doses causes tachycardia and tremor.

USED FOR · Acute asthma exacerbation, exercise-induced bronchospasm, COPD exacerbation, hyperkalemia (drives K into cells).

Albuterol · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Lung sounds, RR, HR, SpO_2 , peak flow, history of cardiac arrhythmia, baseline tremor, recent use frequency.

KEY LABS & MONITORING

Serum potassium (large doses lower K^+), glucose (may rise), peak expiratory flow.

MOST DANGEROUS ADVERSE EFFECT

Paradoxical bronchospasm (rare but life-threatening — stop drug), severe tachyarrhythmia, hypokalemia, hyperglycemia.

COMMON SIDE EFFECTS

Tachycardia, tremor, nervousness, throat irritation, headache, palpitations.

HOLD / NOTIFY PROVIDER

Hold and notify if HR > 130 sustained, chest pain, ventricular ectopy, or paradoxical worsening of wheeze. SABA overuse (> 1 canister/month or > 2 days/week) = poor asthma control.

ANTIDOTE / REVERSAL

No specific antidote · supportive care · β -blocker for severe tachyarrhythmia (use cautiously — can worsen bronchospasm).

PATIENT TEACHING

Shake inhaler, use spacer, exhale fully, slow inhalation while pressing, hold breath 10 sec, wait 1 min between puffs. Track usage. Carry rescue inhaler at all times. SABA first when stacking inhalers.

NURSING ACTION

Verify dose; pre-medicate with SABA 15 min before exercise if exercise-induced. Reassess lung sounds and SpO_2 15 min after dose.

NGN CLINICAL JUDGMENT CUE

02 · DAY 4 RESPIRATORY

Levalbuterol

Xopenex · SABA · R-isomer of albuterol

COMMONLY TESTED

MECHANISM · Pure R-enantiomer of albuterol — same β_2 bronchodilation with **less β_1 cross-reactivity**, so theoretically less tachycardia and tremor.

USED FOR · Acute bronchospasm in clients who cannot tolerate albuterol's cardiac side effects (e.g., known arrhythmia, cardiac history, severe tremor).

Levalbuterol · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Same as albuterol: HR, RR, SpO_2 , lung sounds. Compare HR response to prior albuterol dose if switching.

KEY LABS & MONITORING

Potassium (can drop with high doses), glucose.

MOST DANGEROUS ADVERSE EFFECT

Severe tachycardia (still possible), hypokalemia, paradoxical bronchospasm.

COMMON SIDE EFFECTS

Less tachycardia/tremor than racemic albuterol, but still common; headache, throat irritation.

HOLD / NOTIFY PROVIDER

Hold for HR > 130, chest pain, ventricular ectopy, paradoxical bronchospasm.

ANTIDOTE / REVERSAL

None specific.

PATIENT TEACHING

Same inhaler technique as albuterol. Cost is significantly higher; usually reserved for select patients.

NURSING ACTION

Reassess HR and lung sounds 15 minutes post-dose; compare with prior albuterol responses if applicable.

NGN CLINICAL JUDGMENT CUE

A client switched from albuterol to levalbuterol because of palpitations still develops HR 138 — switching alone does not eliminate β_1 effects.

PRIORITY QUESTION

Q: A client with a history of supraventricular tachycardia needs a SABA. Which is most appropriate?

A. Albuterol HFA

Client used albuterol 8 times in 4 hours with no relief — this is impending status asthmaticus, not a sign the drug is failing.

PRIORITY QUESTION

Q: A nurse caring for a client with asthma notes the client uses albuterol inhaler four times daily. Which interpretation is most accurate?

- A. The asthma is well controlled.
- B. The fluticasone dose should be tapered.
- C. The asthma is uncontrolled and the provider should be notified.
- D. The albuterol should be switched to salmeterol.

ANSWER · C

C is correct. Use of SABA > 2 days/week (other than for exercise) indicates uncontrolled asthma; the controller (ICS) regimen needs to be escalated. **A is wrong** — frequent rescue use is by definition uncontrolled. **B is wrong** — the ICS should be increased, not tapered. **D is wrong** — salmeterol is a LABA and is never used alone for asthma (BBW); it would not replace a rescue inhaler.

TEST-TAKING TIP

On NCLEX, any time you see 'albuterol overuse' or 'rescue inhaler refilled monthly,' the answer involves escalating the controller, not replacing the rescue.

- B. Levalbuterol HFA
- C. Salmeterol HFA
- D. Tiotropium HandiHaler

ANSWER · B

B is correct. Levalbuterol has reduced β_1 cross-reactivity, lowering arrhythmia risk. **A** is more likely to provoke tachycardia. **C** is a LABA (controller), not rescue. **D** is a LAMA for COPD maintenance — also not a rescue.

TEST-TAKING TIP

Recognize Xopenex by the brand name and the keyword 'cardiac-sensitive client'. Whenever you see 'history of arrhythmia' + 'needs a SABA,' think levalbuterol.

03 · DAY 4 RESPIRATORY

Salmeterol / Formoterol

Serevent / Foradil · LABA · Long-acting β_2 agonist (LABA)

BLACK BOX WARNING

MECHANISM · Same β_2 mechanism as SABAs but with a 12-hour duration of action; **not a rescue drug**.

USED FOR · Maintenance therapy for asthma (only with an ICS) and COPD (can be used alone in COPD).

Salmeterol / Formoterol · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Asthma diagnosis confirmed? Is ICS prescribed concurrently? HR, baseline rhythm.

KEY LABS & MONITORING

Potassium with prolonged use.

MOST DANGEROUS ADVERSE EFFECT

Asthma-related death when used as monotherapy in asthma — BLACK BOX WARNING. Tachyarrhythmia, paradoxical bronchospasm.

COMMON SIDE EFFECTS

Headache, throat irritation, tremor, palpitations.

HOLD / NOTIFY PROVIDER

Hold if the client is using it alone for asthma — never start without an ICS. Hold if active bronchospasm; LABA is not rescue.

ANTIDOTE / REVERSAL

None specific. Supportive.

PATIENT TEACHING

NEVER use during an acute attack. Always carry albuterol as rescue. Take twice daily on schedule, even when feeling well. If asthma diagnosis: must be paired with an ICS.

NURSING ACTION

Verify ICS co-prescription in asthma. Educate that improvement is gradual.

NGN CLINICAL JUDGMENT CUE

Client with asthma says 'When I feel wheezy, I just use my Serevent.' This is a BBW-level teaching error — they need immediate correction.

PRIORITY QUESTION

Q: A nurse reviews medications for a client with persistent asthma. Which prescription requires *immediate* clarification with the provider?

- A. Albuterol HFA PRN
- B. Salmeterol HFA twice daily as monotherapy
- C. Fluticasone HFA twice daily
- D. Montelukast 10 mg PO at bedtime

ANSWER · B

B is correct. LABA monotherapy in asthma carries an FDA black-box warning for increased asthma-related death. The

04 · DAY 4 RESPIRATORY

Fluticasone / Budesonide

Flovent / Pulmicort · ICS · Inhaled corticosteroid

TEACHING HEAVY

MECHANISM · Reduces airway inflammation by inhibiting cytokine production and mast cell activity. Onset is gradual — **not a rescue drug**.

USED FOR · Daily controller for persistent asthma; reduces exacerbations and airway remodeling.

order must be clarified — LABA must be combined with an ICS (e.g., Advair). **A, C, D** are appropriate.

TEST-TAKING TIP

On NCLEX, whenever you see 'salmeterol' or 'formoterol' alone next to the word 'asthma,' the answer is 'clarify the order' or 'requires more teaching.'

Fluticasone / Budesonide • Clinical Dossier

MUST-ASSESS BEFORE GIVING

Inhaler technique, mouth (white patches = thrush), voice quality, growth in pediatric clients (slight growth velocity slowing).

KEY LABS & MONITORING

None routine; consider bone density with prolonged high-dose use.

MOST DANGEROUS ADVERSE EFFECT

Oral candidiasis, dysphonia, growth velocity reduction in children (small), adrenal suppression (high-dose, prolonged).

COMMON SIDE EFFECTS

Hoarseness, sore throat, oral thrush, headache.

HOLD / NOTIFY PROVIDER

Hold and notify if oral thrush develops; treat with nystatin and review technique. Do not abruptly discontinue if on high dose long term — taper considered.

ANTIDOTE / REVERSAL

Nystatin swish-and-swallow for thrush.

PATIENT TEACHING

Daily on schedule even when asymptomatic. **Rinse and spit after every dose.** Use a spacer. SABA first when stacking. Improvement takes days to weeks. Don't stop suddenly.

NURSING ACTION

Inspect mouth, demonstrate spacer use, review schedule, document peak flow trend.

NGN CLINICAL JUDGMENT CUE

Client stopped fluticasone three weeks ago because 'I felt fine' and now is in the ED with exacerbation — adherence failure is the root cause.

PRIORITY QUESTION

Q: A client has been using fluticasone HFA for one month and reports a sore throat and white patches on the tongue. The nurse's priority action is to:

- A. Continue the inhaler and reassure the client.
- B. Stop the inhaler permanently.
- C. Hold the dose, notify the provider, and review spacer/rinse technique.
- D. Switch to albuterol.

ANSWER • C

C is correct. Oral candidiasis from ICS deposition needs antifungal therapy (nystatin) and a technique review (spacer + rinse). **A** ignores a treatable adverse effect. **B** is excessive — the drug is therapeutically necessary. **D** confuses controller with rescue.

TEST-TAKING TIP

ICS = controller. SABA = rescue. NCLEX loves to test this distinction with phrases like 'feels fine' and 'used as needed.'

05 · DAY 4 RESPIRATORY

Prednisone

Deltasone · Systemic oral corticosteroid

HIGH RISK

MECHANISM · Broad anti-inflammatory and immunosuppressive effect — suppresses cytokines, neutrophils, and lymphocyte function.

USED FOR · Asthma exacerbation, COPD exacerbation, autoimmune flares, organ-rejection prevention, severe allergic reactions.

Prednisone · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Glucose (especially in diabetics), BP, weight, signs of infection, GI history (ulcer risk), bone density baseline, mental status.

KEY LABS & MONITORING

Blood glucose, electrolytes (K loss), CBC (WBC may rise), bone density if chronic.

MOST DANGEROUS ADVERSE EFFECT

Adrenal suppression with abrupt withdrawal, hyperglycemia, infection, osteoporosis, GI bleed, psychosis, cataracts.

COMMON SIDE EFFECTS

Mood changes, insomnia, weight gain, moon face, hyperglycemia, fluid retention, increased appetite.

HOLD / NOTIFY PROVIDER

Hold and notify for new infection signs (steroids mask fever), severe hyperglycemia, GI bleed. NEVER abruptly stop after > 7–10 days.

ANTIDOTE / REVERSAL

No reversal. Taper to allow HPA axis recovery.

PATIENT TEACHING

Take with food. Never stop abruptly. Monitor glucose if diabetic. Wear medical alert ID if chronic use. Avoid live vaccines and sick contacts. Take in morning to mimic cortisol cycle.

NURSING ACTION

Verify taper schedule. Educate on infection precautions and stress dosing if surgery/illness.

NGN CLINICAL JUDGMENT CUE

A client on chronic prednisone reports new-onset back pain and a recent fall — compression fracture risk from steroid-induced osteoporosis.

PRIORITY QUESTION

Q: A client with COPD has been on prednisone 40 mg daily for 14 days. The provider orders abrupt discontinuation. The nurse should:

- A. Discontinue as ordered.
- B. Question the order and recommend a taper.

06 · DAY 4 RESPIRATORY

Methylprednisolone IV

Solu-Medrol · IV corticosteroid

HIGH RISK · ACUTE

MECHANISM · Same mechanism as prednisone but IV onset (peak effect 4–6 hours) for acute inflammatory conditions.

USED FOR · Status asthmaticus, acute COPD exacerbation, anaphylaxis adjunct, acute MS flare, organ-rejection treatment.

Methylprednisolone IV · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Glucose, BP, infection signs, mental status. Verify IV line.

KEY LABS & MONITORING

Glucose, potassium, WBC.

MOST DANGEROUS ADVERSE EFFECT

Hyperglycemia, immunosuppression, fluid retention, psychosis, hypokalemia, GI bleed.

COMMON SIDE EFFECTS

Insomnia, mood swings, flushing, elevated BP, increased appetite.

HOLD / NOTIFY PROVIDER

Hold if active untreated systemic infection unless life-threatening indication.

ANTIDOTE / REVERSAL

None reversal; supportive.

PATIENT TEACHING

Onset is gradual — relief is not immediate. Insulin may be needed temporarily for hyperglycemia. Monitor for infection.

NURSING ACTION

Verify line patency, infuse slowly, monitor glucose q6h, watch for psychiatric side effects.

NGN CLINICAL JUDGMENT CUE

Status asthmaticus client begins IV methylprednisolone but expects 'instant' improvement — peak effect is 4–6 hours; bronchodilators do the immediate work.

PRIORITY QUESTION

Q: During an acute asthma exacerbation, a nurse administers IV methylprednisolone. Which finding indicates the medication is working as intended?

- A. SpO₂ improves from 87% to 95% within 5 minutes.
- B. Wheezing increases significantly within 1 hour.
- C. Inflammation-driven bronchoconstriction reduces over 4–6 hours, with steady SpO₂ improvement.
- D. Glucose drops to 65 mg/dL.

ANSWER · C

C is correct. Peak anti-inflammatory effect is 4–6 hours. **A** is too fast — likely from bronchodilator. **B** is the opposite of expected. **D** is wrong — steroids *raise* glucose.

C. Continue the dose without further action.

D. Switch to inhaled steroid.

ANSWER · B

B is correct. Systemic steroids > 7–10 days require tapering to prevent adrenal insufficiency and Addisonian crisis. **A** risks acute adrenal crisis. **C** does not address the order error. **D** may be part of the long-term plan but does not address the systemic-steroid problem.

TEST-TAKING TIP

NCLEX always tests 'never abruptly stop' for steroids on chronic regimens. Cushing's symptoms = steroid excess; Addisonian = abrupt withdrawal.

TEST-TAKING TIP

Whenever NCLEX mentions IV steroid in asthma, remember it works on inflammation (slow) while bronchodilators work on smooth muscle (fast).

07 · DAY 4 RESPIRATORY

Ipratropium

Atrovent · DuoNeb · Short-acting muscarinic antagonist (SAMA)

COMMONLY TESTED

MECHANISM · Blocks acetylcholine at M3 receptors → bronchodilation. Anticholinergic effect, additive with β_2 agonists.

USED FOR · COPD exacerbation (often combined with albuterol as DuoNeb), severe acute asthma adjunct.

Ipratropium · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Glaucoma (narrow-angle), urinary retention, BPH history, allergy to atropine, peanut/soy allergy (older formulations).

KEY LABS & MONITORING

None routine.

MOST DANGEROUS ADVERSE EFFECT

Acute narrow-angle glaucoma (sprayed in eye), severe urinary retention.

COMMON SIDE EFFECTS

Dry mouth, metallic taste, cough, blurred vision if sprayed in eye.

HOLD / NOTIFY PROVIDER

Hold and notify for sudden eye pain, vision change, urinary retention.

ANTIDOTE / REVERSAL

None specific; supportive.

PATIENT TEACHING

Close eyes during nebulization or use mask snugly to protect eyes. Sip water for dry mouth. Always paired with β_2 agonist in DuoNeb.

NURSING ACTION

Verify mask fit during nebulization; instruct on eye protection; ensure SABA is given *after* ipratropium if separate.

NGN CLINICAL JUDGMENT CUE

Client receiving nebulized ipratropium without mask develops eye pain and halos around lights — possible acute angle-closure glaucoma.

PRIORITY QUESTION

Q: A client receiving nebulized ipratropium reports sudden severe eye pain and halos around lights. The nurse's priority action is to:

- A. Continue the nebulizer treatment.
- B. Stop the treatment, notify the provider, and obtain immediate ophthalmology evaluation.
- C. Administer artificial tears.
- D. Increase the dose.

ANSWER · B

08 · DAY 4 RESPIRATORY

Tiotropium

Spiriva HandiHaler / Respimat · Long-acting muscarinic antagonist (LAMA)

TEACHING · COPD

MECHANISM · 24-hour M3 blockade → sustained bronchodilation. **Not for asthma rescue.**

USED FOR · COPD maintenance therapy. Reduces exacerbations.

Tiotropium · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Narrow-angle glaucoma, BPH/urinary retention, milk-protein allergy (HandiHaler contains lactose), inhaler technique.

KEY LABS & MONITORING

None routine.

MOST DANGEROUS ADVERSE EFFECT

Narrow-angle glaucoma, urinary retention, paradoxical bronchospasm.

COMMON SIDE EFFECTS

Dry mouth, constipation, cough, urinary hesitancy.

HOLD / NOTIFY PROVIDER

Hold for new eye pain, urinary retention, paradoxical worsening.

ANTIDOTE / REVERSAL

None specific.

PATIENT TEACHING

Once-daily use. HandiHaler: capsule for the device, NEVER swallowed. Respimat: prime device first use. Not a rescue inhaler. Avoid in milk-protein allergy (HandiHaler).

NURSING ACTION

Verify the device matches the prescription; demonstrate proper loading; ensure the client understands daily routine.

NGN CLINICAL JUDGMENT CUE

COPD client has been swallowing the HandiHaler capsules instead of inhaling them — drug exposure inadequate; explains failure to improve.

PRIORITY QUESTION

Q: A client with COPD demonstrates use of the Spiriva HandiHaler. Which action requires correction?

- A. Loads one capsule, presses the buttons to pierce it, inhales twice deeply.
- B. Swallows the capsule with water before inhaling.
- C. Cleans the device weekly.
- D. Reports the capsule must not be swallowed.

ANSWER · B

B is correct. The capsule is for the device — the powder is inhaled, not swallowed. Swallowing renders the drug ineffective. The other options are correct.

B is correct. These are signs of acute angle-closure glaucoma — a true ophthalmologic emergency. **A and D** worsen the condition. **C** is insufficient.

TEST-TAKING TIP

*Anticholinergic = 'can't see, can't pee, can't spit, can't sh*t.'*
Memorize the four cardinal anticholinergic effects.

TEST-TAKING TIP

Recognize 'HandiHaler' or 'Respimat' = LAMA, once daily, COPD only, never rescue.

09 · DAY 4 RESPIRATORY

Montelukast

Singulair · Leukotriene receptor antagonist

BBW · NEUROPSYCHIATRIC

MECHANISM · Blocks leukotriene receptors → reduces bronchoconstriction, mucus, and inflammation.

USED FOR · Mild persistent asthma, exercise-induced bronchospasm, allergic rhinitis (adjunct).

Montelukast · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Mental health history (depression, anxiety, ideation), current mood, sleep, behavior changes in children.

KEY LABS & MONITORING

None routine.

MOST DANGEROUS ADVERSE EFFECT

BLACK BOX: neuropsychiatric effects — depression, agitation, hostility, suicidal ideation, vivid dreams, sleep disturbance.

COMMON SIDE EFFECTS

Headache, GI upset, fatigue, rash.

HOLD / NOTIFY PROVIDER

Hold and notify if new depression, mood change, or behavioral change. Particularly monitor in adolescents.

ANTIDOTE / REVERSAL

None specific. Stop drug.

PATIENT TEACHING

Take at bedtime daily. Report any mood change, depression, sleep disturbance, or behavior change immediately — drug-related and reversible. NOT a rescue medication.

NURSING ACTION

Screen for depression/SI at every visit; educate family on warning signs.

NGN CLINICAL JUDGMENT CUE

Adolescent on montelukast develops new aggression and tells parents he 'feels weird' — neuropsychiatric side effect; stop drug and notify provider.

PRIORITY QUESTION

Q: A teenager taking montelukast for asthma has been more withdrawn and tearful recently. The parent asks about side effects. The nurse should:

- A. Reassure that these are unrelated to the medication.
- B. Suggest continuing and re-evaluating in 6 months.
- C. Notify the provider immediately and review for mood/behavior changes per the BBW.
- D. Increase the dose to control asthma better.

ANSWER · C

C is correct. Montelukast carries a BBW for neuropsychiatric effects. Any mood change requires prompt provider

10 · DAY 4 RESPIRATORY

Theophylline

Theo-Dur · Methylxanthine bronchodilator

NARROW THERAPEUTIC INDEX

MECHANISM · Inhibits phosphodiesterase → bronchodilation; also stimulates CNS and cardiac muscle.

USED FOR · Less commonly used today — second-line for COPD or asthma not controlled with first-line agents.

Theophylline · Clinical Dossier

MUST-ASSESS BEFORE GIVING

HR, BP, lung sounds, smoking status, caffeine intake, medications (cipro, erythromycin, cimetidine).

KEY LABS & MONITORING

Theophylline serum level 10–20 mcg/mL therapeutic; check 30 min before next dose; CBC, electrolytes.

MOST DANGEROUS ADVERSE EFFECT

Seizures, ventricular arrhythmias, severe nausea, tachycardia.

COMMON SIDE EFFECTS

Tachycardia, GI upset, insomnia, headache, tremor.

HOLD / NOTIFY PROVIDER

Hold and notify for level > 20 mcg/mL, symptoms of toxicity, or significant interaction starting.

ANTIDOTE / REVERSAL

Activated charcoal if recent overdose, hemodialysis for severe toxicity, beta-blocker (cautiously) for tachyarrhythmia, anticonvulsants for seizures.

PATIENT TEACHING

Take at same time daily. Avoid sudden caffeine increase. Don't smoke (smoking lowers level — quitting raises it). Report nausea, palpitations, tremors immediately. Many drug interactions — review all OTC additions.

NURSING ACTION

Check serum level before dose adjustment; monitor cardiac rhythm; coordinate with pharmacy on interactions.

NGN CLINICAL JUDGMENT CUE

Theophylline level 24 mcg/mL with new tachycardia and tremor — toxic; stop drug and prepare for cardiac monitoring.

PRIORITY QUESTION

Q: A client on theophylline has a serum level of 22 mcg/mL and reports new nausea and palpitations. The nurse's priority action is to:

- A. Administer the next scheduled dose.
- B. Hold the dose, notify the provider, and place on cardiac monitor.
- C. Recheck the level in 4 hours.
- D. Encourage caffeine for energy.

ANSWER · B

notification. **A** dismisses a known risk. **B** delays intervention. **D** ignores the actual issue.

TEST-TAKING TIP

'Singulair-suicidal' is the mnemonic. Black box for neuropsych effects, particularly in adolescents.

B is correct. A level > 20 mcg/mL with toxicity symptoms requires immediate hold, provider notification, and cardiac monitoring (ventricular arrhythmia risk). **A** would worsen toxicity. **C** delays response. **D** caffeine is a methylxanthine that worsens toxicity.

TEST-TAKING TIP

'10 to 20' is the magic theophylline window — memorize and recognize as a board favorite. Any fluoroquinolone or macrolide added to theophylline = toxicity alert.

11 · DAY 4 RESPIRATORY

Epinephrine IM

EpiPen · Auvi-Q · 1 mg/mL · Sympathomimetic · $\alpha + \beta$ agonist

EMERGENCY · FIRST LINE

MECHANISM · Stimulates α (vasoconstriction → raises BP, reduces edema), β_1 (cardiac output), β_2 (bronchodilation, mast cell stabilization). Single drug that reverses all features of anaphylaxis.

USED FOR · Anaphylaxis (first-line, no exceptions), severe asthma when nebulizers fail, croup (nebulized racemic), cardiac arrest (IV — different concentration).

Epinephrine IM · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Vital signs, airway patency, urticaria, suspected trigger, recent food/medication/sting exposure.

KEY LABS & MONITORING

None pre-dose in an emergency — never delay for labs.

MOST DANGEROUS ADVERSE EFFECT

Hypertensive crisis, ventricular arrhythmia, pulmonary edema (in cardiac history). Local tissue necrosis if extravasation IV.

COMMON SIDE EFFECTS

Tachycardia, palpitations, anxiety, tremor, pallor, headache.

HOLD / NOTIFY PROVIDER

Never withhold for suspected anaphylaxis. Caution but not contraindication in CAD, HTN, hyperthyroidism.

ANTIDOTE / REVERSAL

For tachyarrhythmia: cautious β -blocker. For hypertensive crisis: vasodilator (phentolamine).

PATIENT TEACHING

Auto-injector technique: 'blue to the sky, orange to the thigh.' Inject mid-anterolateral thigh through clothing if needed. Hold 3 sec. Massage site. Call 911. **Always give epinephrine first — antihistamines and steroids are adjuncts.** Carry two pens at all times.

NURSING ACTION

Administer IM (vastus lateralis) at 0.3–0.5 mg adult / 0.01 mg/kg pediatric. Repeat q5–15 min PRN. Position supine with legs elevated. Apply O_2 .

NGN CLINICAL JUDGMENT CUE

Client given oral diphenhydramine for anaphylaxis with stridor — wrong drug, wrong route; epinephrine IM is the only first-line treatment.

PRIORITY QUESTION

Q: A client develops stridor, hypotension, and urticaria 5 minutes after starting IV penicillin. After stopping the infusion, the nurse's next action is to:

- A. Administer IV diphenhydramine.
- B. Administer IM epinephrine 0.3 mg into the thigh.

12 · DAY 4 RESPIRATORY

Acetylcysteine

Mucomyst · Acetadote · Mucolytic + acetaminophen antidote

DUAL USE · HIGH RISK

MECHANISM · Breaks disulfide bonds in mucus (mucolytic); replenishes glutathione (acetaminophen antidote).

USED FOR · Thick mucus (CF, COPD, pneumonia), acetaminophen overdose (PO or IV).

Acetylcysteine · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Lung sounds, ability to clear airway (suction available), bronchospasm history (often pre-medicate with SABA), acetaminophen overdose: time since ingestion, dose, liver function.

KEY LABS & MONITORING

LFTs (AST, ALT, INR, bilirubin) for APAP OD; serum acetaminophen level at 4 hours and Rumack-Matthew nomogram.

MOST DANGEROUS ADVERSE EFFECT

Bronchospasm with inhaled form (pre-medicate with SABA), anaphylactoid reaction with IV form, hepatotoxicity if APAP OD not treated.

COMMON SIDE EFFECTS

Rotten-egg sulfur smell, nausea, vomiting, rash.

HOLD / NOTIFY PROVIDER

Hold for active severe bronchospasm; resume after SABA pre-medication.

ANTIDOTE / REVERSAL

N/A — this IS an antidote.

PATIENT TEACHING

The smell is normal but unpleasant — does not mean malfunction. Suction may be needed after inhaled dose to clear loosened mucus. For APAP OD: time-critical — most effective within 8–10 hours of ingestion.

NURSING ACTION

Pre-medicate with albuterol if inhaled; have suction ready; monitor LFTs and INR for APAP OD; verify dosing per nomogram.

NGN CLINICAL JUDGMENT CUE

Client receiving Mucomyst nebulizer suddenly develops audible wheezing — acetylcysteine-induced bronchospasm; stop, give SABA, then resume with pre-medication.

PRIORITY QUESTION

Q: A client is admitted 4 hours after ingesting 30 acetaminophen 500 mg tablets. Which action takes priority?

- A. Activated charcoal alone.
- B. Administer acetylcysteine per the Rumack-Matthew nomogram.
- C. Wait 24 hours and recheck LFTs.

C. Wait for the provider to arrive.

D. Apply ice to the IV site.

ANSWER · B

B is correct. IM epinephrine is first-line for anaphylaxis. **A** is adjunctive and slower. **C** delays life-saving intervention. **D** is irrelevant. Stop the trigger and give epinephrine immediately.

TEST-TAKING TIP

For NCLEX: anaphylaxis = epinephrine FIRST. The 'right' concentration is 1 mg/mL (1:1000) for IM. Don't confuse with 0.1 mg/mL (1:10,000) used IV for cardiac arrest.

D. Administer naloxone.

ANSWER · B

B is correct. NAC is most effective within 8–10 hours of ingestion. **A** alone misses the antidote. **C** wastes the critical treatment window. **D** naloxone is for opioids.

TEST-TAKING TIP

Two uses, both NCLEX favorites: 'thick mucus' or 'Tylenol overdose' → acetylcysteine. The rotten-egg smell is a classic recognition cue.

13 · DAY 4 RESPIRATORY

Guaifenesin

Mucinex · Robitussin · Expectorant

OTC · COMMON

MECHANISM · Increases respiratory tract fluid → thins mucus → easier to cough up.

USED FOR · Productive cough with thick secretions (cold, bronchitis).

Guaifenesin · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Cough quality, hydration, lung sounds.

KEY LABS & MONITORING

None.

MOST DANGEROUS ADVERSE EFFECT

Rare. GI upset.

COMMON SIDE EFFECTS

Mild nausea, dizziness, drowsiness.

HOLD / NOTIFY PROVIDER

Hold for cough > 7 days without improvement — needs provider evaluation.

ANTIDOTE / REVERSAL

None.

PATIENT TEACHING

Drink plenty of fluids to enhance effect. Do not use for dry, non-productive cough. Read OTC labels — many combination products contain guaifenesin + dextromethorphan + acetaminophen + pseudoephedrine.

NURSING ACTION

Reinforce hydration; teach combination-product awareness.

NGN CLINICAL JUDGMENT CUE

Client takes Mucinex DM + Tylenol Cold + NyQuil for a cough — risk of unrecognized acetaminophen overdose from layered combination products.

PRIORITY QUESTION

Q: A client with bronchitis asks about taking guaifenesin (Mucinex). Which instruction is most important?

- A. Take with a glass of orange juice.
- B. Drink at least 8 glasses of water daily to enhance effectiveness.
- C. Avoid all fluids.
- D. Take with milk.

ANSWER · B

B is correct. Adequate hydration is required for guaifenesin to thin mucus. **A, C, D** are irrelevant or counterproductive.

TEST-TAKING TIP

Expectorant = water + drug; you need both. Always pair guaifenesin teaching with hydration.

14 · DAY 4 RESPIRATORY

Dextromethorphan

Delsym · Robitussin DM · Antitussive · sigma-1 receptor agonist

OTC · ABUSE POTENTIAL

MECHANISM · Suppresses the medullary cough center.

USED FOR · Dry, non-productive cough.

Dextromethorphan · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Cough quality, current medications (especially SSRIs and MAOIs — serotonin syndrome risk).

KEY LABS & MONITORING

None.

MOST DANGEROUS ADVERSE EFFECT

Serotonin syndrome with SSRIs/MAOIs; CNS depression with abuse.

COMMON SIDE EFFECTS

Drowsiness, dizziness, mild GI upset.

HOLD / NOTIFY PROVIDER

Hold if on MAOIs or SSRI/SNRI with concerning symptoms; cough > 7 days.

ANTIDOTE / REVERSAL

Supportive; benzodiazepines for serotonin syndrome agitation.

PATIENT TEACHING

DM is abused at high doses for euphoria (especially in adolescents). Keep out of reach. Do not combine with SSRIs without provider awareness. Read combination-product labels carefully.

NURSING ACTION

Screen for SSRI/MAOI use before recommending; counsel adolescents and families on abuse potential.

NGN CLINICAL JUDGMENT CUE

Client on sertraline starts OTC Robitussin DM and develops agitation, tremor, hyperthermia — possible serotonin syndrome.

PRIORITY QUESTION

Q: A client takes sertraline daily for depression and asks about a cough syrup. Which is the safest choice?

- A. Dextromethorphan
- B. Codeine cough syrup
- C. Guaifenesin
- D. Diphenhydramine

ANSWER · C

C is correct. Guaifenesin has no serotonergic activity. **A** can cause serotonin syndrome with SSRIs. **B** is an opioid with sedation/dependence risk. **D** causes sedation and anticholinergic effects.

TEST-TAKING TIP

DM + SSRI = serotonin syndrome. Always check medication list before recommending DM.

15 · DAY 4 RESPIRATORY

Codeine cough syrup

Codeine / Promethazine · Opioid antitussive

BBW · PEDIATRIC RISK

MECHANISM · Opioid agonist at the cough center.

USED FOR · Severe cough not relieved by non-opioids — but used cautiously due to risks.

Codeine cough syrup · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Age (BBW age limits), respiratory status, history of substance use, sleep apnea.

KEY LABS & MONITORING

None routine.

MOST DANGEROUS ADVERSE EFFECT

Respiratory depression — fatal in ultra-rapid CYP2D6 metabolizers, particularly children; constipation, dependence.

COMMON SIDE EFFECTS

Sedation, constipation, nausea.

HOLD / NOTIFY PROVIDER

Contraindicated in children < 12, in children < 18 post-tonsillectomy/adenoidectomy, and in breastfeeding mothers due to neonatal respiratory depression risk.

ANTIDOTE / REVERSAL

Naloxone 0.4–2 mg IV/IM/IN.

PATIENT TEACHING

Avoid alcohol and CNS depressants. Use only as prescribed. Keep away from children. Counsel on respiratory depression warning signs.

NURSING ACTION

Screen age and recent tonsillectomy status. Have naloxone available. Educate on overdose signs.

NGN CLINICAL JUDGMENT CUE

A 10-year-old prescribed codeine syrup at home is found unresponsive with shallow breathing — opioid respiratory depression, give naloxone.

PRIORITY QUESTION

Q: A 7-year-old with a viral cough is brought to the clinic. Which medication is contraindicated?

- A. Honey-based home remedy (> 1 year old)
- B. Codeine cough syrup
- C. Saline nasal spray
- D. Increased fluids

ANSWER · B

B is correct. Codeine is contraindicated in children under 12 (BBW). **A, C, D** are safe non-pharmacologic measures.

TEST-TAKING TIP

16 · DAY 4 RESPIRATORY

Benzonatate

Tessalon Perles · Non-opioid peripheral antitussive

SAFETY · CHOKING RISK

MECHANISM · Anesthetizes stretch receptors in lungs, bronchi, and pleura → suppresses cough reflex peripherally.

USED FOR · Symptomatic relief of cough in adults and children > 10 years.

Benzonatate · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Age (> 10), ability to swallow whole.

KEY LABS & MONITORING

None.

MOST DANGEROUS ADVERSE EFFECT

Oropharyngeal anesthesia if chewed/crushed → choking, laryngospasm, cardiac arrest. Overdose deaths in children who chew capsules.

COMMON SIDE EFFECTS

Dizziness, headache, GI upset, mild sedation.

HOLD / NOTIFY PROVIDER

Hold and notify if signs of oral numbness, difficulty swallowing.

ANTIDOTE / REVERSAL

Supportive; airway management.

PATIENT TEACHING

Swallow whole — never chew, crush, suck, or open the capsule. Keep out of reach of children. The capsule numbs the mouth and throat if broken, causing choking.

NURSING ACTION

Verify the client can swallow whole capsules; emphasize do-not-chew warning at every dose.

NGN CLINICAL JUDGMENT CUE

Toddler found chewing on a grandmother's Tessalon capsule and develops drooling and difficulty swallowing — oropharyngeal anesthesia, prepare to support airway.

PRIORITY QUESTION

Q: Which teaching is most important for a client newly prescribed benzonatate (Tessalon)?

- A. Take with food to prevent nausea.
- B. Swallow the capsules whole — do not chew, crush, or open them.
- C. Avoid driving for 24 hours.
- D. Drink at least 8 glasses of water daily.

ANSWER · B

B is correct. Chewing causes oropharyngeal anesthesia, choking, laryngospasm, and even death. **A, C, D** are not the priority safety teaching.

TEST-TAKING TIP

For NCLEX peds, opioids = age check. Codeine < 12, no exceptions; promethazine < 2 also BBW.

Tessalon = swallow whole. The visual mnemonic is a Perle (pearl) — round, intact, hard.

17 · DAY 4 RESPIRATORY

Magnesium sulfate IV

Mg sulfate 2 g IV · Smooth-muscle relaxant

STATUS ASTHMATICUS ADJUNCT

MECHANISM · Relaxes bronchial smooth muscle by inhibiting calcium uptake.

USED FOR · Status asthmaticus refractory to first-line therapy. (Also obstetric uses: preeclampsia, preterm labor — but not the focus today.)

Magnesium sulfate IV · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Deep tendon reflexes, RR, BP, urine output, renal function (Mg cleared renally).

KEY LABS & MONITORING

Serum magnesium (therapeutic 4–7 mEq/L for OB; respiratory dosing one-time bolus); creatinine.

MOST DANGEROUS ADVERSE EFFECT

Respiratory depression, hyporeflexia, hypotension, cardiac arrest at high levels.

COMMON SIDE EFFECTS

Flushing, warmth, mild hypotension, nausea.

HOLD / NOTIFY PROVIDER

Hold and notify for RR < 12, absent DTRs, urine output < 30 mL/hr, severe hypotension.

ANTIDOTE / REVERSAL

Calcium gluconate 1 g IV.

PATIENT TEACHING

Expect warmth and flushing during infusion. Report difficulty breathing, dizziness, irregular heartbeat.

NURSING ACTION

Infuse 2 g over 20 min on pump. Monitor RR, DTRs, BP, urine output q15min during and 1 hour post. Keep calcium gluconate at bedside.

NGN CLINICAL JUDGMENT CUE

Client receiving IV Mg for status asthmaticus has absent patellar reflexes and RR of 10 — magnesium toxicity; stop infusion, give calcium gluconate, notify provider.

PRIORITY QUESTION

Q: A client in status asthmaticus is receiving IV magnesium sulfate. The nurse notes absent deep tendon reflexes and RR of 10. The priority action is to:

- A. Continue the infusion as ordered.
- B. Stop the infusion, administer calcium gluconate, and notify the provider.
- C. Decrease the infusion rate.
- D. Reposition the client and reassess.

ANSWER · B

18 · DAY 4 RESPIRATORY

Omalizumab

Xolair · Anti-IgE monoclonal antibody (biologic)

BBW · ANAPHYLAXIS

MECHANISM · Binds free IgE → prevents mast cell activation and degranulation.

USED FOR · Severe persistent allergic asthma not controlled by ICS + LABA.

Omalizumab · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Confirmed IgE-mediated asthma, weight, allergy history, prior anaphylaxis to monoclonal antibodies.

KEY LABS & MONITORING

Serum IgE level (used to calculate dose).

MOST DANGEROUS ADVERSE EFFECT

Anaphylaxis (BBW) — can occur up to 24 hours after injection. Malignancy concern (controversial).

COMMON SIDE EFFECTS

Injection-site reaction, headache, viral upper respiratory infection, joint pain.

HOLD / NOTIFY PROVIDER

Hold and notify for prior anaphylaxis to the drug.

ANTIDOTE / REVERSAL

For anaphylaxis: epinephrine IM, supportive care.

PATIENT TEACHING

Given subq in clinic. **Stay in clinic 2 hours after each dose for observation.** Carry an EpiPen. Report any wheeze, throat tightness, dizziness within 24 hours.

NURSING ACTION

Have epinephrine readily available at every administration. Observe 2 hours post-dose. Educate on home symptoms.

NGN CLINICAL JUDGMENT CUE

Client receiving Xolair injection develops throat tightness 30 minutes later — anaphylaxis; give IM epinephrine immediately.

PRIORITY QUESTION

Q: A client is scheduled for the first omalizumab injection. Which is most important for the nurse to plan?

- A. Schedule the injection for the end of the clinic day.
- B. Ensure epinephrine is at the bedside and observe the client for 2 hours post-dose.
- C. Pre-medicate with diphenhydramine.
- D. Discontinue all other asthma medications.

ANSWER · B

B is correct. Anaphylaxis is a BBW for omalizumab; observation and immediate access to epinephrine are essential. **A** increases risk by reducing staff. **C** not standard. **D** is the opposite of indicated.

B is correct. Hyporeflexia and respiratory depression are signs of magnesium toxicity; the antidote is IV calcium gluconate, and the infusion must be stopped. **A and C** ignore active toxicity. **D** delays life-saving treatment.

TEST-TAKING TIP

Magnesium toxicity sequence: lose reflexes → respiratory depression → cardiac arrest. The antidote 'calcium gluconate' is a board favorite — memorize cold.

TEST-TAKING TIP

All biologic mAbs (-mab suffix) carry anaphylaxis risk. Same caution applies to dupilumab, mepolizumab, rituximab, etc.

19 · DAY 4 RESPIRATORY

Dornase alfa

Pulmozyme · Mucolytic · recombinant human DNase

CF SPECIFIC

MECHANISM · Cleaves DNA in mucus of CF lungs → reduces viscosity.

USED FOR · Cystic fibrosis to reduce exacerbations and improve lung function.

Dornase alfa · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Lung function (FEV1), CF status, nebulizer technique.

KEY LABS & MONITORING

PFTs.

MOST DANGEROUS ADVERSE EFFECT

Pharyngitis, voice alteration, rash, conjunctivitis. Rare bronchospasm.

COMMON SIDE EFFECTS

Sore throat, hoarse voice, chest pain, fever.

HOLD / NOTIFY PROVIDER

Rarely held; report bronchospasm.

ANTIDOTE / REVERSAL

None specific.

PATIENT TEACHING

Nebulized once or twice daily. Refrigerate. Do not mix with other medications in the nebulizer. Use the prescribed nebulizer/compressor system.

NURSING ACTION

Verify nebulizer compatibility; reinforce refrigeration storage; coordinate with CF team.

NGN CLINICAL JUDGMENT CUE

CF client stores Pulmozyme on the kitchen counter for two days — drug degraded; effectiveness compromised.

PRIORITY QUESTION

Q: A nurse is teaching the parents of a child with cystic fibrosis about dornase alfa (Pulmozyme). Which statement indicates understanding?

- A. 'We will mix the medication with the albuterol nebulizer solution.'
- B. 'We will keep the medication refrigerated and use a dedicated nebulizer.'
- C. 'We will give it once a week.'
- D. 'We can stop it if our child feels well for two weeks.'

ANSWER · B

B is correct. Dornase alfa requires refrigeration and should not be mixed with other nebulizer medications. **A** may inactivate it. **C** is wrong — daily dosing. **D** would reverse pulmonary improvement.

TEST-TAKING TIP

20 · DAY 4 RESPIRATORY

Diphenhydramine

Benadryl · First-generation H1 antihistamine

COMMON · CAUTION ELDERLY

MECHANISM · Blocks H1 receptors → reduces urticaria, pruritus, rhinitis; also anticholinergic and CNS-sedating effects.

USED FOR · Allergic reactions (adjunct to epinephrine in anaphylaxis), urticaria, allergic rhinitis, motion sickness, mild sleep aid.

Diphenhydramine · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Age (avoid in elderly per Beers criteria — falls, delirium), BPH, glaucoma, mental status, recent CNS depressants.

KEY LABS & MONITORING

None routine.

MOST DANGEROUS ADVERSE EFFECT

Sedation, anticholinergic toxicity, paradoxical excitation in children and elderly, falls.

COMMON SIDE EFFECTS

Drowsiness, dry mouth, blurred vision, urinary retention, constipation.

HOLD / NOTIFY PROVIDER

Avoid in elderly; hold for severe sedation, urinary retention, glaucoma, BPH.

ANTIDOTE / REVERSAL

Physostigmine for severe anticholinergic toxicity (specialist use only).

PATIENT TEACHING

Avoid driving and alcohol. Not a long-term sleep solution. Not first-line for anaphylaxis — epinephrine first.

NURSING ACTION

For anaphylaxis: give after epinephrine. Avoid in clients > 65 unless no alternative. Educate on sedation.

NGN CLINICAL JUDGMENT CUE

Elderly client given Benadryl for sleep falls during the night — anticholinergic delirium and increased fall risk in older adults.

PRIORITY QUESTION

Q: An 82-year-old with insomnia asks about diphenhydramine for sleep. The nurse should:

- A. Approve, as it is commonly used.
- B. Recommend a higher dose for better effect.
- C. Discourage use due to fall risk, anticholinergic effects, and delirium in older adults (Beers criteria).
- D. Suggest taking it with alcohol for stronger effect.

ANSWER · C

C is correct. Diphenhydramine is on the Beers list for older adults due to anticholinergic and sedation risks. **A, B, D** all

Recognize Pulmozyme as a CF-specific medication, not a general asthma drug.

increase harm.

TEST-TAKING TIP

*First-generation antihistamines = sedating + anticholinergic.
Second-generation (loratadine, cetirizine, fexofenadine) = preferred.*

21 · DAY 4 RESPIRATORY

Nicotine replacement therapy

Nicoderm patch · Nicorette gum · Smoking-cessation aid

HEALTH PROMOTION

MECHANISM · Provides controlled nicotine without combustion toxins; reduces withdrawal cravings.

USED FOR · Smoking cessation; reduces risk of MI, COPD progression, lung cancer.

22 · DAY 4 RESPIRATORY

Oxygen therapy

O₂ · Medical gas · prescription required

SAFETY · ENVIRONMENT

MECHANISM · Raises FiO₂ → corrects hypoxemia.

USED FOR · Hypoxemia of any cause: asthma, COPD, pneumonia, PE, sepsis, MI, post-op.

Oxygen therapy · Clinical Dossier

MUST-ASSESS BEFORE GIVING

SpO₂, ABG, RR, work of breathing, mental status, history of CO₂ retention, fire-source proximity.

KEY LABS & MONITORING

ABG (PaO₂, PaCO₂).

MOST DANGEROUS ADVERSE EFFECT

Oxygen toxicity at FiO₂ > 50% for > 24 h (ARDS-like pulmonary fibrosis), CO₂ narcosis in COPD retainers, fire/explosion, drying of mucosa.

COMMON SIDE EFFECTS

Nasal dryness, skin irritation under cannula, anxiety from being on O₂.

HOLD / NOTIFY PROVIDER

Titrate down if SpO₂ rises above target (≥ 92% asthma, 88–92% COPD).

ANTIDOTE / REVERSAL

None — adjust FiO₂.

PATIENT TEACHING

No smoking, no open flames, no petroleum products near O₂ source. No electric razors or aerosol sprays in the room. Keep tubing free of kinks. Humidify if > 4 L/min.

NURSING ACTION

Verify SpO₂ target. Confirm fire-safety signage. Educate family. Document delivery device, flow, FiO₂, and target SpO₂.

NGN CLINICAL JUDGMENT CUE

COPD client with chronic CO₂ retention placed on 6 L/min via nasal cannula becomes drowsy and confused — CO₂ narcosis; reduce O₂ to lowest effective flow, target SpO₂ 88–92%.

PRIORITY QUESTION

Q: A nurse cares for a client with COPD whose home O₂ is set at 2 L/min. The client asks for a higher flow rate due to mild dyspnea. The nurse should:

- A. Increase to 6 L/min as requested.
- B. Maintain the prescribed flow, recheck SpO₂ targeting 88–92%, and reassess work of breathing.
- C. Discontinue oxygen.
- D. Switch to a non-rebreather at 15 L/min.

ANSWER · B

B is correct. Chronic CO₂ retainers rely on hypoxic drive; over-oxygenation suppresses respiratory drive (CO₂

Nicotine replacement therapy · Clinical Dossier

MUST-ASSESS BEFORE GIVING

Smoking history (pack-years), motivation, cardiac history, prior cessation attempts, current nicotine intake.

KEY LABS & MONITORING

None routine.

MOST DANGEROUS ADVERSE EFFECT

Cardiac events if smoking continues with the patch on (additive nicotine) – insomnia, vivid dreams.

COMMON SIDE EFFECTS

Skin irritation (patch), mouth/throat irritation (gum/lozenge), nausea, headache.

HOLD / NOTIFY PROVIDER

narcosis). The target is 88–92%. **A and D** risk narcosis. **C** risks hypoxia.

TEST-TAKING TIP

COPD oxygen target = 88–92%. Asthma and most acute conditions = $\geq 92\%$. Memorize the two targets – board favorite.

Five Must-Not-Miss Rules

Bolded NCLEX killers. These are the rules that, when ignored, end a question wrong every time.

SABA before ICS — always. 01

When a client uses both a rescue inhaler (albuterol) and an inhaled corticosteroid (fluticasone), the SABA goes first to open the airway so the steroid can reach the lower respiratory tract. Reverse order = inadequate deposition.

TEACHING · ORDER MATTERS

LABA monotherapy in asthma is a black-box killer. 02

Salmeterol and formoterol must *never* be used alone for asthma — only paired with an ICS. Monotherapy increases asthma-related death. This does *not* apply to COPD-only use.

BLACK BOX WARNING

Rinse mouth after every ICS dose. 03

Inhaled corticosteroids deposit on oral mucosa and cause oral candidiasis (thrush) and dysphonia. Rinse and spit after every dose — and use a spacer to reduce deposition.

PATIENT TEACHING

Theophylline therapeutic level is 10–20 mcg/mL. 04

Outside that window, expect toxicity: tachycardia, seizures, ventricular dysrhythmias. Caffeine, cigarette smoking, ciprofloxacin, and erythromycin all shift the level. Hold and notify if level > 20 .

NARROW THERAPEUTIC INDEX

Never give a fluoroquinolone with theophylline — and never give codeine cough syrup to a child < 12 . 05

Cipro raises theophylline levels into the toxic range. Codeine has a black-box warning for children < 12 and post-tonsillectomy/adenoidectomy children < 18 due to fatal respiratory depression from ultra-rapid CYP2D6 metabolism.

LETHAL INTERACTION · BBW PEDS

concurrent smoking before applying or replacing a patch.

§ 04

Dosage & Calculation Safety

Five calculation-grade questions. Compute first, then tap to reveal work and rationale.

1

A child weighing **18 kg** requires albuterol nebulizer at **0.15 mg/kg/dose** (max 5 mg). Available solution is **2.5 mg / 3 mL unit dose**. How many milligrams should be delivered, and is the unit dose adequate?

Dose: 2.7 mg. The standard 2.5 mg unit-dose is approximately therapeutic but slightly below the calculated dose. The nurse should consult the provider; some institutions allow rounding to 2.5 mg, but for a calculated 2.7 mg, the provider may order a higher-strength concentrate or two 1.25 mg unit doses combined.

$$18 \text{ kg} \times 0.15 \text{ mg/kg} = 2.7 \text{ mg (under the 5 mg ceiling)}$$

2

A 6-year-old (22 kg) presents with anaphylaxis. The provider orders **epinephrine 0.01 mg/kg IM** using the **1 mg/mL (1:1000)** concentration. The maximum single pediatric dose is 0.5 mg. How many mL do you give?

Give 0.22 mL IM. Use the 1 mg/mL (1:1000) concentration for IM — the IV concentration (0.1 mg/mL or 1:10,000) is for cardiac arrest, not anaphylaxis. Inject into the anterolateral thigh (vastus lateralis).

$$22 \text{ kg} \times 0.01 \text{ mg/kg} = 0.22 \text{ mg} \rightarrow 0.22 \text{ mg} \div 1 \text{ mg/mL} = 0.22 \text{ mL}$$

3

An adult is admitted with status asthmaticus. The order is **magnesium sulfate 2 g IV over 20 minutes**. Pharmacy provides **2 g in 50 mL D5W**. What is the infusion rate in mL/hr?

150 mL/hr. Verify the bedside pump matches. Monitor deep tendon reflexes, respiratory rate, and blood pressure — magnesium causes vasodilation, hypotension, and respiratory depression. Calcium gluconate is the antidote.

$$50 \text{ mL} \div 20 \text{ min} \times 60 \text{ min/hr} = 150 \text{ mL/hr}$$

4

A client on theophylline reports nausea, palpitations, and tremors. The morning serum theophylline level is **24 mcg/mL**. The therapeutic range is **10–20 mcg/mL**. What is the priority nursing action, and by how much is the level out of range?

Hold the dose and notify the provider immediately. The level is 4 mcg/mL above the upper therapeutic limit — already in the toxic range. Symptoms confirm clinical toxicity; next steps may include activated charcoal if recent oral ingestion and continuous cardiac monitoring for ventricular arrhythmias and seizures.

$$24 \text{ mcg/mL} - 20 \text{ mcg/mL (max)} = 4 \text{ mcg/mL above range} \cdot \text{symptomatic toxicity}$$

5

A prednisone burst for an asthma exacerbation reads: **40 mg PO daily × 5 days, then 30 mg × 3 days, then 20 mg × 3 days, then 10 mg × 3 days, then stop.** Tablets are **10 mg**. How many total tablets are dispensed?

38 tablets total. Always taper systemic steroids when used > 7–10 days to avoid adrenal insufficiency. Counsel clients never to abruptly stop and to take with food to reduce GI upset.

4 tabs × 5 d = 20 · 3 × 3 = 9 · 2 × 3 = 6 · 1 × 3 = 3 → Total 38 tablets dispensed

§ 05

NGN Items · Five Formats

Matrix, SATA, prioritization, bow-tie, and drop-down/cloze — the same five formats that drive the 2026 NCLEX-RN case studies and stand-alone items.

• ITEM 1 • MATRIX • INHALER TEACHING

A 14-year-old with persistent asthma is prescribed *albuterol HFA* as needed and *fluticasone HFA* twice daily. The nurse reviews technique with the client and parent. For each client statement, mark whether the response indicates *correct understanding*, *requires more teaching*, or is *not relevant* to inhaler use.

CLIENT / PARENT STATEMENT	CORRECT	NEEDS TEACHING	NOT RELEVANT
"I'll rinse my mouth and spit after the fluticasone."	☒	☐	☐
"If I'm wheezing, I take the fluticasone first because it's the strongest."	☐	☒	☐
"I should shake the inhaler and use a spacer."	☒	☐	☐
"I can stop the fluticasone once my symptoms go away for a week."	☐	☒	☐
"I'll keep a peak flow log and call the provider if I drop into the yellow zone repeatedly."	☒	☐	☐
"I'll take the inhaler with a glass of orange juice."	☐	☐	☒

Rationale: Albuterol (SABA) is for acute symptoms and must always precede the ICS; ICS is a controller used daily even when asymptomatic. Rinsing and using a spacer reduce oral thrush and dysphonia. Discontinuing fluticasone after symptom resolution is the most common cause of asthma exacerbation rebound. Peak-flow yellow-zone monitoring reflects appropriate self-management. Oral fluids have no role in inhaler administration.

• ITEM 2 · SELECT ALL THAT APPLY (SATA) · LABA + ICS COMBINATION

A 58-year-old with moderate persistent asthma is started on a combination salmeterol/fluticasone inhaler. The nurse plans education. **Which teaching points should be included? Select all that apply.**

- A. "This inhaler is not for use during an acute asthma attack — keep your albuterol available for rescue."
- B. "Use this inhaler once every day at the first sign of wheezing."
- C. "Rinse your mouth with water and spit after each dose."
- D. "Stopping this medication abruptly may cause an adrenal crisis."
- E. "Report tremors, chest pain, or a fast heartbeat to your provider."
- F. "You should not use a long-acting beta agonist alone for asthma."

Correct: A, C, E, F. A is correct because LABA + ICS combinations are *controllers*, not rescue medications. C reduces oral candidiasis from the ICS component. E identifies sympathomimetic adverse effects of the LABA. F directly addresses the black-box warning — LABA must always be combined with an ICS for asthma.

Incorrect: B (controller is used daily on a schedule, not PRN at first sign of wheezing). **D** is incorrect because adrenal suppression from inhaled steroids is rare at therapeutic doses and is more relevant to systemic, not inhaled, corticosteroids.

• ITEM 3 • ORDERED RESPONSE • ANAPHYLAXIS

A 24-year-old develops sudden stridor, urticaria, and lip swelling after receiving IV ceftriaxone. Order the nurse's actions from **first (1)** to **last (5)**.

- ☐ Administer IV diphenhydramine 50 mg per order.
- ☐ Administer epinephrine 0.3 mg IM into the anterolateral thigh.
- ☐ Stop the ceftriaxone infusion.
- ☐ Position the client supine with legs elevated and call for the rapid response team.
- ☐ Apply high-flow oxygen and obtain vital signs.

Correct order: 1) Stop the infusion → 2) Epinephrine 0.3 mg IM → 3) Call rapid response and position supine with legs elevated → 4) High-flow oxygen and vitals → 5) IV diphenhydramine.

Removing the trigger comes first, but is meaningless without immediate epinephrine — the only intervention that reverses laryngeal edema and shock. Diphenhydramine treats urticaria/pruritus but does *not* reverse anaphylaxis and is always second-line behind epinephrine. Positioning supine improves preload during distributive shock; oxygen supports the work of breathing. NCLEX trap: never delay IM epinephrine to start an IV.

• ITEM 4 • BOW-TIE • STATUS ASTHMATICUS

A 19-year-old with poorly controlled asthma arrives in the ED: RR 32, HR 138, SpO₂ 87% on room air, tripodding, accessory muscle use, faint wheezes that are diminishing. Drag the correct items into the bow-tie.

ACTIONS TO TAKE

Continuous nebulized albuterol + ipratropium

IV methylprednisolone

High-flow O₂ to keep SpO₂ ≥ 92%

**Status
Asthmaticus**

PARAMETERS TO MONITOR

Peak flow / SpO₂ trend

ABG (rising PaCO₂ = pre-arrest)

Mental status & work of breathing

Condition (center): Status asthmaticus.

Actions (left): Continuous nebulized albuterol + ipratropium drive maximal bronchodilation; IV methylprednisolone reduces airway inflammation (takes 4–6 hours to peak — start early); supplemental O₂ corrects hypoxemia. Consider IV magnesium sulfate 2 g over 20 min as adjunct.

Parameters (right): A "silent chest" (diminishing wheeze) signals worsening obstruction, not improvement. A *rising* PaCO₂ in an asthmatic who was tachypneic is the most ominous finding — it predicts respiratory failure and intubation. Mental-status decline (drowsiness, confusion) is a late, pre-arrest finding.

Trap: Do not give beta-blockers, sedatives, or opioids — all worsen bronchospasm or mask deterioration.

• ITEM 5 • DROP-DOWN CLOZE • THEOPHYLLINE TOXICITY

A 67-year-old with COPD on oral theophylline is admitted with a urinary tract infection and started on *ciprofloxacin*. On hospital day 2 the client reports nausea and palpitations. Vital signs: HR 132, BP 102/64, RR 22. The morning serum theophylline level returns at **26 mcg/mL**.

Complete the statement by selecting the most appropriate option from each drop-down:

The client is exhibiting signs of **▼ theophylline toxicity**, which is most likely caused by **▼ a CYP1A2 inhibitor interaction with ciprofloxacin**. The nurse's priority action is to **▼ hold the next dose and notify the provider**, and the most immediate complication to monitor for is **▼ seizures and ventricular dysrhythmias**.

Rationale: Therapeutic theophylline is 10–20 mcg/mL — 26 mcg/mL is overtly toxic. Ciprofloxacin (and erythromycin, cimetidine, fluvoxamine) inhibits CYP1A2, raising theophylline levels rapidly. The classic toxic triad is tachycardia, GI upset, and CNS excitation. Above 30 mcg/mL, expect seizures (often refractory) and ventricular arrhythmias; cardiac monitoring is essential. The dose must be held and the provider notified. NCLEX recognition tip: any client on theophylline who is also smoking, drinking caffeine, or on a fluoroquinolone or macrolide is a board-favorite drug-interaction scenario.

§ 06

NCJMM Case Study

A six-step walkthrough using the National Council Clinical Judgment Measurement Model — the spine of every 2026 NGN case study.

CASE · STATUS ASTHMATICUS · 17-YEAR-OLD MALE

"My inhaler isn't working anymore."

Marcus, 17, with a history of moderate persistent asthma, arrives in the ED at 02:14 after using his albuterol HFA eight times in the past four hours with no relief. Vital signs: T 37.0°C, HR 142, RR 34, BP 138/82, SpO₂ **86%** on room air. He is leaning forward on his palms (tripod), speaking in two-to-three-word phrases. Lung sounds reveal *diminishing* wheezes bilaterally. Peak flow is 32% of personal best. He has not taken his fluticasone for "about three weeks" because he "felt fine." Pulse-ox waveform is intermittent. The night shift nurse considers the next steps.

STEP 01 · RECOGNIZE CUES

Identify relevant findings

SpO₂ 86%, RR 34, HR 142, tripodding, accessory muscle use, two-to-three-word dyspnea, peak flow at 32% of best, and *diminishing* wheeze. Eight rescue inhaler doses in four hours = SABA overuse. Three-week ICS gap = loss of controller therapy.

STEP 02 · ANALYZE CUES

Cluster and interpret

Together these point to **status asthmaticus** — severe, refractory bronchospasm not responding to standard rescue therapy. A diminishing wheeze in this clinical context is *not* improvement; it reflects critically reduced airflow ("silent chest"). The risk of imminent respiratory failure is high.

STEP 03 · PRIORITIZE HYPOTHESES

Rank what's most urgent

Priority 1: impending respiratory failure (airway). **Priority 2:** uncontrolled bronchospasm (breathing). **Priority 3:** medication non-adherence and adolescent self-management deficit (long-term).

STEP 04 · GENERATE SOLUTIONS

Build the action set

Continuous nebulized albuterol + ipratropium; IV methylprednisolone; high-flow O₂ titrated to SpO₂ ≥ 92%; IV magnesium sulfate 2 g over 20 min if no improvement; continuous cardiac monitoring; prepare for intubation (RSI kit at bedside). Hold any beta-blocker, sedative, or opioid orders.

STEP 05 · TAKE ACTION

Execute in priority order

Apply high-flow O₂ → start continuous nebulizer with ipratropium → establish two large-bore IVs → administer IV methylprednisolone → notify provider and respiratory therapist → call rapid response if SpO₂ does not rise above 92% within 5 minutes → prepare magnesium sulfate.

STEP 06 · EVALUATE OUTCOMES

Did it work?

Expected: SpO₂ ≥ 92%, RR < 24, peak flow > 50% of best, return of clear wheezing (paradoxically a good sign as airflow improves), HR trending down, ABG with PaCO₂ in low-normal range. **Red-flag deterioration:** rising PaCO₂, altered mental status, exhaustion — escalate to intubation.

§ 07

Red Flags

When you see *this*, do *that*. The findings that should never be charted and walked away from.

Stop · Hold · Notify · Rescue

Eight clinical findings that trigger immediate respiratory-medication action.

Diminishing wheeze in active asthma exacerbation

RAPID RESPONSE · "silent chest" — impending respiratory failure, not improvement.

Theophylline level > 20 mcg/mL

HOLD DOSE · notify provider — seizures and ventricular arrhythmias above 30.

Rising PaCO₂ in tachypneic asthmatic

PRE-ARREST · prepare for intubation — the patient is tiring.

White patches on tongue in ICS user

HOLD DOSE · notify provider — oral candidiasis; nystatin swish-and-swallow and review technique.

Anaphylaxis with stridor or hypotension

GIVE EPINEPHRINE · 0.3–0.5 mg IM thigh, 1 mg/mL — first, before anything else.

Bradypnea, pinpoint pupils after codeine

GIVE NALOXONE · 0.4–2 mg IV/IM/IN — opioid antitussive respiratory depression.

SpO₂ falling in chronic CO₂ retainer on O₂

TITRATE CAUTIOUSLY · keep SpO₂ 88–92% in COPD to preserve hypoxic drive.

Suicidal ideation in client on montelukast

STOP DRUG · BBW for neuropsychiatric effects (mood, aggression, suicidality).

§ 08

Easily Confused Drugs

The look-alikes that lose questions. Memorize the contrasts, not the names.

Albuterol	vs	Fluticasone
SABA · rescue		
	ROLE	
ICS · controller		
PRN, acute symptoms		
	WHEN	
Daily, scheduled		
Onset 5–15 min		
	ONSET	
Days–weeks		
Tremor, tachycardia		
	WATCH FOR	
Thrush, dysphonia		
First in sequence		
	ORDER	
Second; rinse after		

Salmeterol	vs	Albuterol
LABA · long-acting		
	CLASS	
SABA · short-acting		
12-hour duration		
	DURATION	
4–6 hours		
NEVER alone in asthma (BBW)		
	ASTHMA USE	
Rescue agent		
Maintenance only		
	ONSET	
Fast — minutes		
Pair with ICS always		
	PEARL	
Stand-alone for emergencies		

Ipratropium

V S

Tiotropium

SAMA · short

CLASS

LAMA · long

4–6 hours QID

DOSING

Once daily

Acute exacerbation adjunct

ROLE

COPD maintenance only

Combo with albuterol (DuoNeb)

COMBO

HandiHaler/Respimat capsule

Dry mouth, urinary retention

WATCH

Same + narrow-angle glaucoma

Theophylline

V S

Montelukast

Methylxanthine PO/IV

CLASS

Leukotriene antagonist PO

10–20 mcg/mL therapeutic

MONITORING

None routine

Cipro, smoking shift levels

INTERACTIONS

Minimal

Seizures, arrhythmias

TOXICITY

Neuropsychiatric BBW

Rarely used today

USE

Allergic rhinitis, mild asthma

Acetylcysteine

V S

Guaifenesin

Mucolytic (breaks bonds)

ACTION

Expectorant (thins)

Nebulized or IV/PO

ROUTE

Oral only

CF, mucus plugs, APAP OD

USE

Productive cough · OTC

Rotten-egg smell, bronchospasm

CAUTION

Drink fluids, GI upset

Also acetaminophen antidote

PEARL

Cough + chest cold OTC

Epinephrine IM

V S

Epinephrine IV

1 mg/mL (1:1000)

CONCENTRATION

0.1 mg/mL (1:10,000)

Anaphylaxis

INDICATION

Cardiac arrest

0.3–0.5 mg thigh

DOSE

1 mg q3–5 min

Adult auto-injector 0.3 mg

PEDIATRIC

0.01 mg/kg IV

Never confuse routes

NCLEX TRAP

Lethal at wrong dose

DAY 4 · CHEAT SHEET

Everything in *one breath.*

Class · Onset · Role

Albuterol (SABA)	5-15 min · rescue
Salmeterol (LABA)	12 hr · controller + ICS
Ipratropium (SAMA)	15 min · adjunct
Tiotropium (LAMA)	24 hr · COPD daily
Fluticasone (ICS)	Days · daily control
Methylprednisolone IV	4-6 hr · exacerbation
Montelukast	Hours · maintenance
Theophylline	Narrow TI · rarely used
Epinephrine IM	Minutes · anaphylaxis
Magnesium IV	20 min · status asth.
Acetylcysteine Neb	· mucolytic + APAP antidote

NCLEX Priority Ranking

Anaphylaxis → IM epinephrine **EMERGENCY**

Status asthmaticus management **HIGH RISK**

Theophylline level interpretation **SAFETY ALERT**

Inhaler technique + ICS teaching **TEACHING**

Antitussive / mucolytic selection **SUPPORTIVE**

Acronym · SOAR

For respiratory drug administration order.

S

SABA first
(open the airway)

O

O₂ to maintain SpO₂
(≥ 92% asthma)

A

Anti-inflammatory
(ICS or systemic)

R

Rinse the mouth
(after every ICS)

THEOPHYLLINE THERAPEUTIC

10-20 mcg/mL

Hold > 20 · toxic

ASTHMA SPO₂ TARGET

≥ 92%

COPD: 88-92%

EPINEPHRINE IM DOSE

0.3-0.5 mg

1 mg/mL · thigh

PEAK FLOW ZONES G·Y·R ≥80 · 50–79 · <50%	NALOXONE REVERSAL 0.4–2 mg Codeine OD	MAGNESIUM IV BOLUS 2 g / 20 min Status asthmaticus
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DAY 04 · RESPIRATORY · NCLEX-RN 2026 · **Pharmacological & Parenteral Therapies** · Aligned with the 2026 NCSBN Test Plan and NCJMM Clinical Judgment Model · Click cards to flip · Tap "reveal" for rationale