NCLEX-RN · 2026 TEST PLAN · NCJMM ALIGNED | PHARMACOLOGY BRIEF · NO. 047 | RESPIRATORY SYSTEM

VOLUME IV · RESCUE INHALERS · BETA AGONISTS

SABAs. *Save A Breath* Asap.

Short-Acting Beta-2 Adrenergic Agonists — the rescue medication that opens airways in minutes.

RESCUE INHALER
BETA-2 SELECTIVE
BRONCHODILATOR
NCJMM PRIORITY

CLASS	SYSTEM	ONSET / DURATION	USE
Beta-2 Agonist (SABA)	Respiratory · Bronchial	5-15 min · 4-6 hrs	Acute · PRN · Rescue

01 Drug Overview

WHY WE GIVE IT

"When the airways close, **SABA opens them in minutes.***"*

SABAs are **selective beta-2 adrenergic agonists** that relax bronchial smooth muscle to reverse acute bronchospasm. They are **rescue medications** — fast, short-acting, and used PRN for acute symptoms. They are **NOT** long-term controllers and do not treat the underlying inflammation of asthma.

MOST TESTED DRUG

Albuterol

ProAir HFA · Ventolin HFA · Proventil HFA
The #1 rescue inhaler — appears in nearly every NCLEX respiratory question.

🫁 Key Indications

- **Acute bronchospasm** — first-line rescue
- **Asthma exacerbation** — rescue/PRN
- **COPD exacerbation** — symptom relief
- **Exercise-induced bronchospasm** — 15–30 min before activity
- **Status asthmaticus** — continuous nebulizer
- Terbutaline only: **preterm labor** (off-label tocolytic)

🚨 High-Yield Clinical Use

- **"Rescue" inhaler** — for sudden symptoms only
- Used **BEFORE inhaled corticosteroid** (opens airway for steroid delivery)
- **Hospital protocol:** stacked nebs every 20 min × 3 doses for severe attack
- Effectiveness measured by **peak flow improvement** + symptom relief

⚠ Increased SABA use = **worsening asthma control**

⚠ More than **2 days/week** = poor control, escalate therapy

02 Mechanism of Action

HOW IT WORKS

01 SABA Inhaled
Drug delivered to bronchial tree

→

02 Binds β-2 Receptor
Selective for bronchial smooth muscle

→

03 ↑ cAMP
Activates adenylyl cyclase

04 Smooth Muscle Relaxes
Bronchial dilation begins

→

05 Bronchodilation
Airway diameter expands

→

06 ↑ Airflow · ↓ Wheezing
Symptom relief in minutes

🫁 PRIMARY EFFECT
Bronchodilation

⚡ SECONDARY B-2
Hypokalemia · Tremor

❤️ B-1 SPILLOVER
Tachycardia · Tremor

ONSET	PEAK	DURATION	PRE-EXERCISE
5–15 min	30–60 min	4–6 hrs	15–30 min before

🧠 Receptor Logic — The "2 Lungs" Rule

- **β-2 = LUNGS** (you have **2 lungs**) → bronchodilation, vasodilation, ↓ K^+
- **β-1 = HEART** (you have **1 heart**) → ↑ HR, ↑ contractility
- SABAs are **β-2 selective** — but at higher doses they "spill over" to β-1, causing tachycardia and tremor
- This is why **beta-blockers** (especially nonselective like propranolol) cause bronchospasm — they block β-2

03 Therapeutic Effects

WHAT "WORKING" LOOKS LIKE

✅ Signs the Drug Is Working

- ✓ **Lung sounds clear** — wheezing diminishes or resolves
- ✓ **Decreased work of breathing** — no accessory muscle use, no retractions
- ✓ **Respiratory rate normalizes** — drops toward baseline
- ✓ **↑ Peak Expiratory Flow Rate (PEFR)** — best objective measure
- ✓ **↑ SpO_2** — pulse ox improves toward ≥95%
- ✓ **↓ Dyspnea** — patient reports easier breathing
- ✓ **Able to speak in full sentences**

⚠️ Signs of Inadequate Response

- ⚠ **Wheezing persists** after 2–3 doses
- ⚠ **"Silent chest"** — no breath sounds = severe obstruction
- ⚠ **SpO_2 < 90%** despite treatment
- ⚠ **PEFR < 50%** personal best
- ⚠ **Tripod position**, accessory muscle use, retractions
- ⚠ **Speaking only single words**
- ! **Decreasing LOC, cyanosis** = impending respiratory failure

🚨 **Status Asthmaticus = Medical Emergency**

Severe asthma not responding to SABAs. Prepare for IV corticosteroids, magnesium sulfate, possible intubation.

PRIORITY ACTION

04 Side Effects & Adverse Reactions

COMMON VS LIFE-THREATENING

Common (Expected)

β-1 SPILLOVER

- **Tachycardia** — most common, expected initially
- **Fine tremors** — especially hands (β-2 in skeletal muscle)
- **Nervousness / restlessness / anxiety**
- **Palpitations**
- **Headache**
- **Throat irritation, dry mouth, cough**
- **Insomnia** (especially evening doses)
- **Nausea**
- **Hyperglycemia** — caution in diabetics

Serious / Life-Threatening

REPORT IMMEDIATELY

- ! **Severe tachyarrhythmia** — SVT, V-tach
- ! **Hypokalemia** (drives K^+ *into* cells) → arrhythmia, especially with diuretics or digoxin
- ! **Paradoxical bronchospasm** — worsened wheezing AFTER dose (rare, life-threatening, STOP drug)
- ! **Cardiac arrest** — overuse or in cardiac disease
- ! **Worsening cardiac ischemia / MI** — in CAD patients
- ! **Severe HTN** — especially with MAOIs / TCAs
- ! **Hypersensitivity** — angioedema, urticaria
- ! **Seizures** — at high doses, rare

05 Priority Nursing Considerations

ASSESS · MONITOR · HOLD · NOTIFY

Assess & Monitor EVERY DOSE

- **Lung sounds** — BEFORE and AFTER administration
- **Respiratory rate, depth, effort**
- **SpO_2** — continuous in acute exacerbation
- **Heart rate, BP** — pre/post dose
- **Peak flow / PEFR** — pre/post when ordered
- **Serum potassium** — especially with diuretics
- **Blood glucose** — especially in diabetics
- **Tremor**, anxiety, sleep quality
- **Frequency of use** — track refill pattern

HOLD / NOTIFY Provider If...

- ⚠ **HR > 120–130 bpm** in adults (per protocol/order) — never withhold during acute distress without provider direction
- ⚠ **Chest pain** develops
- ⚠ **Paradoxical bronchospasm** — STOP drug, notify, prepare for emergency airway
- ⚠ **K^+ < 3.5 mEq/L**
- ⚠ **No improvement** after 2–3 doses
- ⚠ **SpO_2 continues to fall** despite treatment
- ⚠ **Severe tremors** impairing function
- ⚠ **Increasing rescue use** (poor control)

Contraindications & Cautions

- **Hypersensitivity** to drug or sulfites
- **Tachyarrhythmias** — caution
- **Cardiac disease / CAD / recent MI** — caution
- **HTN, severe** — caution
- **Hyperthyroidism** — caution (β-2 worsens)
- **Diabetes mellitus** — monitor glucose
- **Seizure disorder** — caution
- **Pregnancy:** Category C (use if benefit > risk)

Drug Interactions HIGH-YIELD

- ⚠ **Beta-blockers** (esp. propranolol) — antagonize SABA + cause bronchospasm. Avoid nonselective β-blockers in asthma
- ⚠ **MAOIs / TCAs** — risk of severe HTN, hyperpyrexia
- ⚠ **Digoxin** — hypokalemia ↑ dig toxicity / arrhythmia
- ⚠ **Loop / thiazide diuretics** — additive hypokalemia
- ⚠ **Other sympathomimetics** — additive cardiac effects
- ⚠ **Theophylline** — additive tachycardia, tremor

06 Labs & Diagnostics

CRITICAL VALUES & MEANING

LAB / TEST	NORMAL RANGE	CRITICAL / WATCH	WHAT IT MEANS IN SABA THERAPY
Potassium (K^+)	3.5 – 5.0 mEq/L	< 3.5 mEq/L	SABAs drive K^+ **into cells** → hypokalemia → arrhythmia risk. Critical with diuretics or digoxin.
Blood Glucose	70 – 110 mg/dL (fasting)	> 200 mg/dL	β-2 stimulation causes **glycogenolysis** → hyperglycemia. Monitor diabetics closely.
Peak Expiratory Flow (PEFR)	≥ 80% personal best (Green)	< 50% (Red Zone)	Best objective measure of bronchodilator response. Green = good · Yellow 50–79% = caution · Red < 50% = emergency.
SpO_2 (Pulse Ox)	≥ 95%	< 90%	Should rise with effective bronchodilation. Persistent low O_2 = inadequate response → escalate.
ABG (acute exacerbation)	pH 7.35–7.45 · $PaCO_2$ 35–45 · PaO_2 80–100	↑ $PaCO_2$ in asthma = ominous	Early asthma = respiratory **alkalosis** (hyperventilation). **Normal or rising $PaCO_2$ = patient tiring → impending failure.**
Heart Rate	60 – 100 bpm	> 120–130 bpm	Mild tachycardia expected. Sustained >120 bpm or new arrhythmia → notify provider.
Magnesium	1.5 – 2.5 mg/dL	Low Mg potentiates ↓K^+	Hypomagnesemia worsens hypokalemia and arrhythmia risk. IV Mg used in severe asthma.

07 Administration & Safety

ROUTE · TECHNIQUE · HIGH-ALERT

Routes & Forms

- **MDI** (metered-dose inhaler) — most common
- **Nebulizer** — acute exacerbation, peds, frail elderly
- **DPI** (dry powder) — less common for SABAs
- **Oral tablets / syrup** — slower onset, more SE
- **SubQ / IV terbutaline** — severe asthma, preterm labor

Correct MDI Technique

- **Shake** well · prime if new/unused >2 weeks
- **Exhale** fully away from inhaler
- **Seal lips** around mouthpiece (or use spacer)
- **Press + inhale slowly** & deeply (3–5 sec)
- **Hold breath 10 seconds**
- Wait **1 minute between puffs**
- Use a **spacer** when possible (better delivery)
- **Rinse mouth** after if also using ICS

Combination Therapy Order

- **SABA FIRST** — opens airway
- Wait **5 minutes**
- **ICS SECOND** — steroid reaches deeper airways
- **Rinse mouth** after ICS (prevents thrush)
- ✓ *"Open before you close"* — bronchodilator opens, steroid closes inflammation

Terbutaline Black Box Warning

Injectable / oral terbutaline for prolonged tocolysis (>48–72 hrs) — risk of maternal cardiac events & death. Not for prevention or prolonged treatment of preterm labor.

FDA BLACK BOX

08 Patient Education

WHAT THE PATIENT MUST KNOW

🎓 Core Teaching Points

- **"This is your RESCUE inhaler"** — for sudden symptoms, NOT daily prevention
- **Carry it at ALL times** — purse, bag, car, school
- **Track every use** — count puffs/dose log
- Use **15–30 min before exercise** if exercise-induced
- Take **SABA before steroid inhaler**, wait 5 minutes
- **Rinse mouth** after if using with ICS
- **Clean MDI** mouthpiece weekly with warm water
- Check the **dose counter** · don't run out · refill early
- Don't share inhalers with others

📞 When to Seek Help

- ⚠ Symptoms not relieved after **2–3 doses** within 20 min
- ⚠ Using rescue inhaler **more than 2 days/week**
- ⚠ Rescue inhaler needed **at night more than 2×/month**
- ⚠ PEFR drops below **50% personal best** (Red Zone)
- ⚠ Increasing shortness of breath or chest tightness
- ⚠ Worsening cough, especially at night
- ⚠ Rapid heartbeat, severe tremor, chest pain after dose
- ! **Difficulty speaking, blue lips, confusion** = 911

🟢🟡🔴 Asthma Action Plan — Peak Flow Zones

GREEN · 80–100%

Doing well. Continue daily controller. SABA only as needed.

YELLOW · 50–79%

Caution. Use SABA. Add/double controller per plan. Call provider if no improvement.

RED · < 50%

Emergency. Take SABA NOW. Call 911 if no relief in 15 min.

09 NCLEX Test Traps

⚠ WHAT STUDENTS MISS

COMMON MISTAKE 01
"Take the steroid inhaler first because it's more important."
TRUTH
SABA first, ICS second, 5 min apart. The bronchodilator opens the airway so the steroid reaches deeper tissue.

COMMON MISTAKE 02
"My albuterol is working great — I'm using it 4 times a day now!"
TRUTH
Increased SABA use = WORSENING control. More than 2 days/week of rescue use means therapy needs to be escalated. Notify provider.

COMMON MISTAKE 03
"Tachycardia after albuterol means an allergic reaction — stop it!"
TRUTH
Mild tachycardia + tremor = expected β-1 spillover, not allergy. Concerning only if HR > 120–130 or sustained, with chest pain, or arrhythmia.

COMMON MISTAKE 04
"SABAs prevent asthma attacks if taken daily."
TRUTH
SABAs are **RESCUE only.** They do not treat inflammation. Daily prevention = **ICS ± LABA** (controller therapy).

COMMON MISTAKE 05
"This patient has asthma and HTN — start propranolol."
TRUTH
Nonselective β-blockers (propranolol, nadolol) are contraindicated in asthma — they cause bronchospasm. Cardioselective (metoprolol, atenolol) used cautiously.

COMMON MISTAKE 06
"Asthma patient's CO_2 is normal — they must be improving."
TRUTH
Asthmatics in distress hyperventilate (**low CO_2, alkalosis**). A **normal or rising CO_2 during an attack = patient is tiring → impending respiratory failure.**

COMMON MISTAKE 07
"Wheezing is gone — the patient's asthma is resolved."
TRUTH
"Silent chest" = severe obstruction, not improvement. No air movement = no wheeze. Combine with ↑ work of breathing, ↓ SpO_2 → emergency.

COMMON MISTAKE 08
"K^+ is 3.2 — that's just dehydration from the asthma attack."
TRUTH
SABAs cause hypokalemia by shifting K^+ into cells. Dangerous with diuretics, digoxin, or in cardiac patients. Monitor + replace as needed.

COMMON MISTAKE 09
"Hold the albuterol — HR is 118, that's too high."
TRUTH
NEVER withhold a rescue inhaler during acute distress based on HR alone. Asthma itself causes tachycardia. Treat the airway → HR often improves.

COMMON MISTAKE 10
"The patient got worse after using the inhaler — give another puff."
TRUTH
Paradoxical bronchospasm = wheezing/dyspnea worse AFTER dose. **STOP the drug**, notify provider, prepare for emergency airway management.

10 Memory Boosters

MNEMONICS & QUICK RECALL

ACRONYM **SABA**

Save **A** **B**reath **A**sap
Rescue inhaler — onset in minutes, used PRN for acute symptoms only.

SIDE EFFECTS **TRACT**

Tachycardia
Restlessness / tremor
Anxiety
Cardiac arrhythmia
Tremor (fine, hands)

RECEPTOR LOGIC **"2 Lungs · 1 Heart"**

β-2 = LUNGS (you have **2**) → bronchodilation, ↓ K^+, tremor
β-1 = HEART (you have **1**) → ↑ HR, ↑ contractility
SABAs are β-2 selective but spill over to β-1 at higher doses.

SUFFIX PATTERN **"-terol"**

Most beta agonists end in **-terol**:
Albu**terol**, Levalbu**terol** (SABAs)
Salme**terol**, Formo**terol**, Vilan**terol** (LABAs)
Exception: Terbutaline, Metaproterenol, Pirbuterol

INHALER ORDER **"Open Before You Close"**

OPEN the airways with SABA first
WAIT 5 minutes
CLOSE inflammation with ICS second
RINSE mouth after ICS to prevent thrush

ASTHMA SEVERITY **"Silent = Severe"**

WHEEZING = some airflow (treatable)
SILENT CHEST = no airflow = **EMERGENCY**
NORMAL CO_2 in attack = patient tiring = impending failure

Most Tested Drugs in This Class

DRUG-BY-DRUG COMPARISON

Drug	Onset / Duration	Key Indications	Distinguishing Features	NCLEX Pearl
Albuterol MOST TESTED *ProAir HFA · Ventolin HFA · Proventil HFA*	5–15 min 4–6 hrs	Acute bronchospasm, asthma rescue, COPD, exercise-induced	The default rescue inhaler. Racemic mixture (R + S isomers). Available MDI, nebulizer, oral, IV.	If a question mentions "rescue inhaler" without naming a drug, assume **albuterol**. Tachycardia & tremor expected.
Levalbuterol *Xopenex*	5–15 min 5–8 hrs	Same as albuterol — alternative when SE intolerable	R-isomer only (active form). **Less tachycardia / tremor** than albuterol. More expensive.	Preferred when patient has cardiac disease or cannot tolerate albuterol's side effects.
Terbutaline *Brethine*	SubQ: 15 min 4–6 hrs	Acute bronchospasm; off-label **preterm labor (tocolytic)**	SubQ / IV / oral. **BLACK BOX:** not for prolonged tocolysis (>48–72 hrs) — maternal cardiac events / death.	Two-faced drug: lungs AND uterus. Pregnant pt + asthma + preterm labor → terbutaline. Watch for maternal tachycardia & pulmonary edema.
Metaproterenol *Alupent*	5–30 min 3–4 hrs	Bronchospasm — older, rarely first-line	Less β-2 selective → **more cardiac side effects**. Largely replaced by albuterol.	Distractor on NCLEX. Recognize as a SABA but know albuterol is preferred.
Pirbuterol *Maxair*	5 min 5 hrs	Bronchospasm — rare	Breath-activated MDI (no shake required). Largely discontinued in many markets.	Mostly historical recognition. Same class warnings apply.

⚖️ SABA vs LABA — Don't Confuse Them

- **SABA (albuterol)** = **RESCUE**. Onset 5–15 min · Duration 4–6 hrs · PRN for acute symptoms
- **LABA (salmeterol, formoterol)** = **CONTROLLER**. Onset 15+ min · Duration 12 hrs · Scheduled BID, NEVER PRN
- ! **BLACK BOX:** LABA monotherapy in asthma → ↑ asthma-related death. Always combined with ICS in asthma.
- Suffix clue: **"sal-/form-/vilan-"** = LABA · **"albu-/levalbu-/terbu-"** = SABA

Clinical Judgment Snapshot

NCJMM · NGN PRIORITY REASONING

What is the #1 priority risk?

RISK **Cardiac arrhythmia** from severe tachycardia + hypokalemia, **plus paradoxical bronchospasm**. In a patient already in respiratory distress, an arrhythmia or worsened obstruction can be lethal within minutes. Cardiac history, diuretic use, or digoxin amplifies the risk.

What will harm the patient FIRST?

TIME **Cardiac stimulation** appears within minutes — tachycardia, tremor, palpitations. The truly catastrophic event (paradoxical bronchospasm) also presents within minutes of administration. **Hypokalemia** develops over the next 30–60 minutes and silently sets up arrhythmia.

What is the FIRST nursing action?

ACTION **ASSESS the airway first** — lung sounds, RR, work of breathing, SpO_2. Then administer SABA per order. **Reassess in 15–20 minutes:** lung sounds, peak flow, HR, SpO_2. **If worse after dose → suspect paradoxical bronchospasm → STOP drug, notify provider, prepare for emergency airway.**

Recognize cues — "the patient is in trouble"

CUES **Silent chest** · accessory muscle use · tripod position · single-word speech · **normal or rising $PaCO_2$** · SpO_2 < 90% · LOC changes · cyanosis. These are signs of impending respiratory failure — escalate immediately.

Take action — what comes next?

PLAN **O_2 → SABA (continuous neb in severe attack) → IV corticosteroid → IV magnesium sulfate → prepare for intubation.** Anticipate ABG, CXR, and ICU transfer. Never withhold rescue therapy for tachycardia in active distress.