MEDICAL-SURGICAL NURSING I · STUDY GUIDE

Exam 3 Study Guide

This guide covers chapters 5 and 6. You will learn why infection looks the way it does, how to run the first hour of sepsis and how to protect a patient with no neutrophils, then why obstructive lung disease is a problem of getting air out and how asthma and COPD are treated. Work one chapter at a time. Read the "what to know" paragraphs, copy the tables out by hand, then try each worked case with the steps covered. Finish each chapter with its ten self-test items. The cram sheet at the end puts every number and rule in one place.

WHAT THIS GUIDE COVERS

- Chapter 5 · why infection looks the way it does, the chain of infection and precautions, healthcare-associated infection bundles, the differential and left shift, lactate and cultures, the older adult, sepsis and septic shock, SIRS, qSOFA and SOFA, the Hour-1 bundle, antimicrobial classes and monitoring, C. difficile, the ANC and neutropenic fever.
- Chapter 6 · air trapping and hyperinflation, the focused respiratory exam, ABGs, capnography and spirometry, asthma and its drugs, status asthmaticus, COPD and GOLD staging, long-term oxygen and the 88 to 92% target, exacerbations and BiPAP, bronchiectasis, cystic fibrosis, sleep apnea, oxygen devices, tracheostomy care and suctioning, inhaler technique and priorities.

CHAPTER 5

Infection, Sepsis and the Immunocompromised Patient

Read it in full: **Chapter 5 in the textbook**. Practice it in the lab: **The First Hour: Sequence the Sepsis Bundle** and **ANC Bench and the Neutropenic Fever Clock**.

What to know

The signs of infection are the host response. Cytokines (TNF alpha, IL-1, IL-6) reset the hypothalamic set point through prostaglandin E2, so the patient shivers and feels cold while the

temperature climbs. The same cytokines make vessels leaky and dilated: redness, heat, swelling and pain locally, and warm skin, a bounding pulse and falling blood pressure systemically.

The **chain of infection** has six links: agent, reservoir, portal of exit, mode of transmission, portal of entry and susceptible host. Hand hygiene breaks the mode of transmission and is the highest-yield act. Alcohol rub is preferred, but use soap and water for visible soil and for spores (C. difficile), because alcohol does not kill spores. Removing a catheter or IV breaks the portal of entry; catheter duration is the strongest predictor of urinary infection. Scrub a hub for at least 15 seconds.

Standard precautions apply to everyone. **Contact**: gown and gloves (MRSA, VRE, scabies; plus soap and bleach for C. difficile and norovirus). **Droplet**: surgical mask within about six feet (influenza, pertussis, meningococcus). **Airborne**: negative-pressure room and fit-tested N95 (tuberculosis, measles, varicella, disseminated zoster). A **protective environment** uses positive pressure and HEPA for allogeneic stem cell transplant patients. Negative pressure protects the unit; positive pressure protects the patient.

Trends announce infection: a creeping respiratory rate (counted for a full minute) and a change in mental status come before hypotension. Fever is 38.3 °C once or 38.0 °C for an hour; hypothermia below 36 °C in an ill patient is worse. A **left shift** (bands over 10%) can appear with a normal WBC. Lactate above 2 mmol/L predicts mortality; 4 or more signals hypoperfusion. Older adults may show only confusion, a fall or new incontinence; a rise of 1.1 °C over baseline is significant, and the family saying he is not himself is a vital sign.

Draw two sets of blood cultures from two sites, 8 to 10 mL per bottle, before antibiotics, but never let cultures delay the antibiotic past about 45 minutes in shock. Collect urine from the catheter port, never the bag. Do not treat asymptomatic bacteriuria in an older adult.

Sepsis is life-threatening organ dysfunction from a dysregulated host response. **Septic shock** needs vasopressors to keep the MAP at least 65 with lactate above 2 after fluids; mortality exceeds 40%. SIRS is sensitive but not specific. qSOFA (RR 22 or more, altered mentation, SBP 100 or less) should not be used alone. A SOFA rise of 2 or more defines organ dysfunction. The Hour-1 bundle: lactate, cultures, broad-spectrum antibiotic, 30 mL/kg crystalloid for hypotension or

lactate of 4 or more, and norepinephrine to a MAP of 65. Do not sedate new agitation; check oxygen, pressure and glucose.

Give the broad drug fast, then de-escalate at 48 to 72 hours. Vancomycin needs kidney and level monitoring; flushing during the infusion is a rate reaction, not an allergy: stop, antihistamine, restart slower (each gram over at least 60 minutes). Aminoglycosides cause kidney injury and permanent ototoxicity; ask daily about tinnitus. Fluoroquinolones cause tendon rupture and QT prolongation. Linezolid lowers platelets and causes serotonin syndrome with SSRIs. Metronidazole plus alcohol causes a disulfiram-like reaction. Anaphylaxis gets IM epinephrine 0.3 to 0.5 mg in the thigh.

C. difficile: test only with three or more unformed stools in 24 hours. Contact precautions, soap and water, bleach. Treat with oral vancomycin or fidaxomicin; IV vancomycin does not reach the colon. Avoid loperamide.

The **ANC** = WBC x (% segs + % bands). Under 1,500 is neutropenia, under 500 severe. Febrile neutropenia (38.3 °C once or 38.0 °C for an hour with ANC under 500) is an emergency: cultures from every lumen and peripherally, then an antipseudomonal beta-lactam within 60 minutes. Do not give acetaminophen before the provider knows. No rectal temperatures, suppositories or enemas. Live vaccines are contraindicated in significant immunosuppression; inactivated vaccines are encouraged. Prednisone 20 mg or more for two weeks or longer is significant immunosuppression and can hide peritonitis.

Hour-1 sepsis bundle: the order at the bedside

1. **Oxygen if hypoxemic**
   Airway and breathing first; do not leave to fetch it
2. **Two large-bore IVs**
   Without access nothing else in the bundle can happen
3. **Lactate and two sets of cultures**
   Two sites, 8 to 10 mL per bottle; never delay the antibiotic
4. **Broad-spectrum antibiotic**
   Within 1 hour of recognition for shock or probable sepsis
5. **Crystalloid 30 mL/kg**
   For hypotension or lactate 4 or more; balanced fluid preferred
6. **Norepinephrine**
   If still hypotensive: target MAP at least 65 mm Hg
7. **Reassess**
   BP, mentation, lungs; repeat lactate in 2 to 4 hours if above 2

Fluids and antibiotics run together once access is in.

The first hour of sepsis. Cultures come before antibiotics only because they are quick. If access is hard, the antibiotic wins.

LOCK THESE IN

- Chain of infection: agent, reservoir, exit, transmission, entry, host. Hand hygiene breaks transmission.
- Soap and water for C. difficile and visible soil. Alcohol does not kill spores.
- Airborne: negative pressure plus N95 (TB, measles, varicella). Droplet: surgical mask.
- Bands over 10% is a left shift. Lactate above 2 is a warning; 4 or more is hypoperfusion.
- Two sets of cultures, two sites, before antibiotics, but never delaying them.
- Hour-1: lactate, cultures, antibiotic, 30 mL/kg crystalloid, norepinephrine to MAP 65.
- Vancomycin flushing is a rate reaction, not an allergy. Infuse 1 g over at least 60 min.
- ANC = WBC x (% segs + % bands). Fever with ANC under 500: antibiotic within 60 min.

Transmission-based precautions

Type	Room	PPE	Examples
Contact	Private or cohort; dedicated equipment	Gown and gloves	MRSA, VRE, ESBL, scabies, RSV
Contact plus (enteric)	Private; bleach cleaning	Gown, gloves; soap and water	C. difficile, norovirus
Droplet	Private; door may stay open	Surgical mask within about 6 ft	Influenza, pertussis, meningococcus
Airborne	Negative pressure, door closed	Fit-tested N95	TB, measles, varicella, disseminated zoster
Protective environment	Positive pressure, HEPA	Standard; mask patient outside	Allogeneic stem cell transplant

Infection labs

Test	Range	Meaning
WBC	5,000 to 10,000/mm^3	Low in an ill patient is more worrying
Bands	0 to 5%	Over 10% is a left shift
ANC	Above 1,500	Under 1,000 moderate; under 500 severe
Lactate	0.5 to 2.0 mmol/L	Over 2 stress or hypoperfusion; 4 or more high mortality
Procalcitonin	Under 0.5 ng/mL	Rises with bacterial, not viral, infection
Platelets	150,000 to 400,000	Falling in sepsis suggests DIC

Antimicrobial monitoring

Drug	Watch for	Nursing point
Vancomycin	Kidney injury, ototoxicity, infusion reaction	AUC 400 to 600 or trough 15 to 20 before 4th dose
Gentamicin, tobramycin	Kidney injury, permanent hearing and balance loss	Trough under 2; ask about tinnitus daily
Fluoroquinolones	Tendon rupture, QT, C. difficile	Separate from Ca, Mg, Fe, Zn by 2 h
Linezolid	Low platelets, serotonin syndrome	Check SSRIs and SNRIs
TMP-SMX	High potassium, rash, crystalluria	Push fluids; raises INR on warfarin
Metronidazole	Metallic taste, disulfiram-like reaction	No alcohol during and 3 days after
Ceftriaxone	Precipitates with calcium	Not with lactated Ringer's

Worked cases

WORKED CASE 1 · A SEPTIC PATIENT IN THE FIRST HOUR

Mrs. Patel, 72 kg, is post-op day three. T 38.7 °C, HR 118, RR 26, BP 88/46, new confusion, lactate 4.4. Her incision drains pus.

STEP 1 · FIND THE MAP

(88 + 2 x 46) ÷ 3 = (88 + 92) ÷ 3 = **60 mm Hg**, under 65.

STEP 2 · NAME IT

Suspected infection with hypotension, confusion and a lactate of 4.4: sepsis, likely progressing to shock.

STEP 3 · ORDER YOUR ACTIONS

Oxygen if hypoxemic, two large-bore IVs, lactate and two sets of cultures, the broad-spectrum antibiotic within the hour.

STEP 4 · COMPUTE THE BOLUS

30 mL/kg x 72 kg = **2,160 mL** of balanced crystalloid, reassessing lungs and mentation between liters.

STEP 5 · NEXT

If the MAP stays under 65, expect norepinephrine. Repeat the lactate in 2 to 4 hours. Call the provider with SBAR and ask for surgical review for source control.

WORKED CASE 2 · AN ANC AND A NEUTROPENIC FEVER

Mr. Kim is on day 10 after chemotherapy. WBC 1,800 with 20% segs and 6% bands. His temperature is 38.4 °C.

STEP 1 · COMPUTE THE ANC

1,800 x (0.20 + 0.06) = 1,800 x 0.26 = **468/mm^3**.

STEP 2 · CLASSIFY

Under 500 is severe neutropenia. One reading of 38.3 or higher meets the fever definition.

STEP 3 · ACT

Notify the provider now, draw cultures from every lumen of his central line and one peripheral set, and give an antipseudomonal beta-lactam (cefepime, piperacillin-tazobactam or meropenem) within 60 minutes.

SAFETY

Do not give acetaminophen before the provider has seen the fever, and take no rectal temperature.

WORKED CASE 3 · A LEFT SHIFT WITH A NORMAL COUNT

Two patients: A has WBC 14,000 with no bands. B has WBC 9,000 with 62% segs and 18% bands.

STEP 1 · READ THE BANDS

B has 18% bands, well over 10%: a left shift, the marrow under heavy demand.

STEP 2 · COMPUTE B'S ANC

9,000 x (0.62 + 0.18) = 7,200, which is normal.

STEP 3 · COMPARE

The book is clear: B is more infected than A despite the lower total count. The differential matters more than the total.

WORKED CASE 4 · A VANCOMYCIN INFUSION REACTION

Twenty minutes into a vancomycin infusion, Ms. Grant's face, neck and upper chest flush and itch. Her airway is clear and her BP is stable.

STEP 1 · RECOGNIZE

This is a rate-related histamine release, not an IgE allergy.

STEP 2 · ACT

Stop the infusion and give an antihistamine as ordered.

STEP 3 · RESTART

Restart at a slower rate, each gram over at least 60 minutes.

WHY IT MATTERS

Charting it as an allergy would deny her the best MRSA drug for life. True anaphylaxis (wheeze, angioedema, hypotension) would need IM epinephrine instead.

TRAPS PEOPLE FALL INTO

- **Using alcohol rub for C. difficile.** Alcohol does not kill spores. Use soap and water.
- **Putting TB on droplet precautions.** TB is airborne: negative pressure and an N95.
- **Holding the antibiotic until cultures are drawn.** Cultures come first only if they are quick. In shock, the antibiotic wins.
- **Collecting urine from the drainage bag.** Use the sampling port after cleaning it.
- **Giving IV vancomycin for C. difficile colitis.** Only oral vancomycin reaches the colon.
- **Reassuring yourself with a normal WBC.** Look at the bands and the ANC.
- **Sedating a newly agitated septic patient.** Agitation is hypoxia or poor perfusion until proven otherwise.
- **Giving acetaminophen to a neutropenic patient with fever first.** Notify, culture and give the antibiotic. Antipyretics can mask the next fever.

Chapter 5 self-test · ten items

1. Which hand hygiene method is required after caring for a patient with C. difficile?

A. Soap and water

B. Alcohol-based rub

C. Chlorhexidine wipe

D. Gloves only

A. Soap and water Alcohol does not kill spores. Friction and rinsing remove them.

2. A patient has suspected pulmonary tuberculosis. Which precaution is needed?

A. Droplet
B. Airborne
C. Contact
D. Protective

B. Airborne TB needs a negative-pressure room and a fit-tested N95.

3. Which link in the chain of infection does removing an unneeded urinary catheter break?

A. Portal of exit
B. Reservoir
C. Portal of entry
D. Infectious agent

C. Portal of entry The catheter is a way in for organisms; duration is the strongest predictor of infection.

4. Which differential shows a left shift?

A. Segs 60%
B. Lymphs 30%
C. Bands 3%
D. Bands 16%

D. Bands 16% Bands above about 10% mean the marrow is releasing immature cells.

5. Which is one of the three qSOFA criteria?

A. HR over 100
B. RR of 22 or more
C. Temp over 38.3 °C
D. WBC over 12,000

B. RR of 22 or more qSOFA uses RR 22 or more, altered mentation and SBP 100 or less.

6. What fluid volume does the Hour-1 bundle give an 80 kg patient with a lactate of 4.5?

A. 2,400 mL
B. 800 mL
C. 1,600 mL
D. 3,200 mL

A. 2,400 mL 30 mL/kg x 80 kg = 2,400 mL of crystalloid.

7. A septic patient remains hypotensive after fluids. Which drug is first-line?

A. Dopamine
B. Phenylephrine
C. Norepinephrine
D. Epinephrine

C. Norepinephrine Norepinephrine raises vascular resistance and is first-line, targeting a MAP of at least 65.

8. A patient on gentamicin reports ringing in the ears. What is the priority?

A. Give the next dose
B. Recheck in 24 hours
C. Offer earplugs
D. Report it right away

D. Report it right away Ototoxicity is often permanent. Report it and check the levels.

9. WBC 2,500, segs 10%, bands 2%. What is the ANC?

A. 2,500
B. 300
C. 250
D. 1,200

B. 300 2,500 x 0.12 = 300, severe neutropenia.

10. Which order should the nurse question for a neutropenic patient?

A. Oral care with soft brush
B. Inactivated flu vaccine
C. Daily bathing
D. Acetaminophen suppository

D. Acetaminophen suppository The rectal route is closed in neutropenia because a tear seeds bacteria into the blood.

CHAPTER 6

Respiratory Disorders: Airway and Obstructive Disease

Read it in full: **Chapter 6 in the textbook**. Practice it in the lab: **Status Asthmaticus: The Escalation Clock** and **Sequence Is a Nursing Intervention**.

What to know

Obstructive disease is a failure of **exhalation**. Lost recoil (emphysema) or a narrowed lumen (bronchospasm, edema, mucus) makes small airways collapse before the alveoli empty. Air trapping causes hyperinflation, a barrel chest, a flat diaphragm, accessory muscle use and the tripod position, which is compensation, not preference. Eventually CO_2 rises.

Count respirations for a full minute (12 to 20) and watch the I:E ratio (normal about 1:2; 1:3 or 1:4 in obstruction). Wheezes are musical and from narrow airways; rhonchi clear with coughing; crackles point to fluid, pneumonia or atelectasis; stridor is upper airway obstruction and an emergency. A **silent chest** in a patient who was wheezing is impending arrest. Clubbing suggests bronchiectasis, CF, cancer or interstitial disease, not plain COPD. Oximetry does not show CO_2 or hemoglobin.

In an early asthma attack the gas shows respiratory alkalosis. A **normalizing $PaCO_2$** in a struggling asthmatic means fatigue and precedes intubation. A chronic COPD patient may live at a compensated respiratory acidosis (pH 7.36, $PaCO_2$ 58, HCO_3 32); treat the change, not the number. Spirometry: FEV1/FVC below 0.70 after bronchodilator confirms COPD; a rise in FEV1 of 12% and 200 mL supports asthma. Peak flow zones: green 80 to 100%, yellow 50 to 79%, red below 50% of personal best.

Asthma is reversible obstruction from bronchospasm, edema and mucus, with an early phase (bronchospasm) and a late phase 4 to 12 hours later (inflammation), which is why steroids are given even after improvement. SABAs (albuterol) are the rescue drug; ICS are controllers with no acute effect; LABAs are never used alone in asthma. Montelukast carries a neuropsychiatric boxed warning; zafirlukast is taken on an empty stomach. Theophylline level about 10 to 20 mcg/mL. Using the rescue inhaler more than twice a week means poor control.

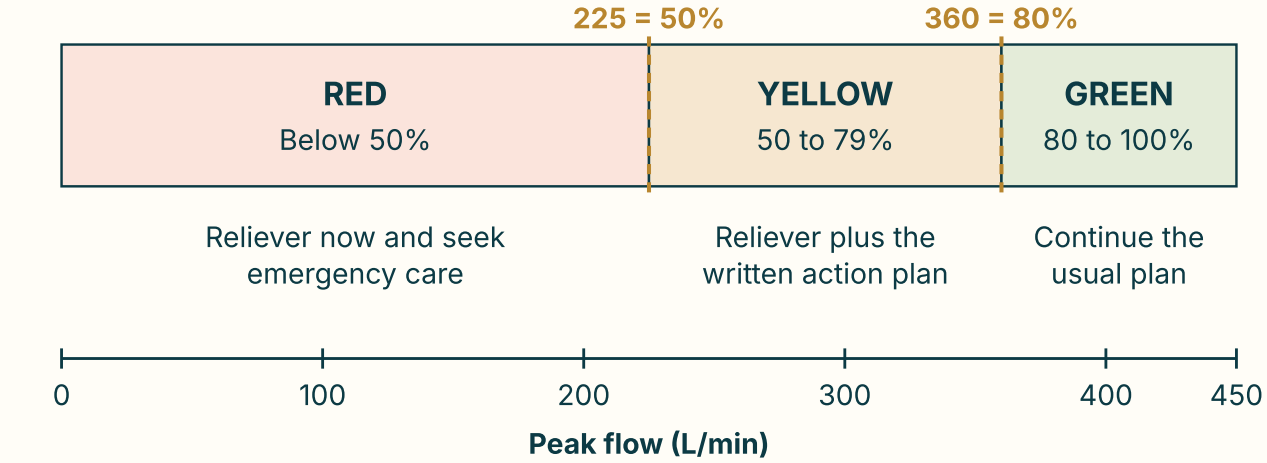
Status asthmaticus: high Fowler, oxygen to 93 to 95%, continuous albuterol with ipratropium, IV access, early systemic steroids, stay with the patient; magnesium 2 g IV for refractory bronchospasm. Avoid sedatives and beta blockers, even timolol eye drops.

COPD is persistent airflow limitation from smoke and dust. Emphysema destroys walls and recoil; chronic bronchitis is a productive cough for three months in two years with early hypoxemia and cor pulmonale. GOLD grades by FEV1: 1 at 80% or more, 2 at 50 to 79%, 3 at 30 to 49%, 4 below 30%. Only smoking cessation, long-term oxygen (15 hours a day or more, for PaO_2 55 or less or SpO_2 88% or less) and selected surgery prolong survival. LAMAs (tiotropium) are first-line maintenance, never rescue. Target SpO_2 88 to 92% in chronic CO_2 retention, but never withhold oxygen from a hypoxemic patient.

An exacerbation shows more dyspnea, more sputum and more purulent sputum. Treat with bronchodilators, about five days of steroids, antibiotics when indicated, controlled oxygen and **BiPAP** for hypercapnic acidosis. Teach pursed-lip breathing (in for two, out for four to six) and small, high-calorie meals.

Bronchiectasis and cystic fibrosis are failures of clearance. The CF sequence is **bronchodilator, mucolytic (hypertonic saline or dornase alfa), airway clearance, then inhaled antibiotic**. Sweat chloride of 60 mmol/L or more is diagnostic; give pancreatic enzymes with every meal and snack. Sleep apnea becomes dangerous once opioids or sedatives are given: bring the patient’s CPAP, use oximetry and position lateral with the head up.

Oxygen is a drug. Nasal cannula 1 to 6 L (24 to 44%), simple mask never below 5 L, non-rebreather 10 to 15 L, Venturi for precise FiO_2. Trach cuff pressure 20 to 25 cm H_2O; a speaking valve only with the cuff fully deflated. Suction only when indicated: preoxygenate, 80 to 120 mm Hg, no more than 10 to 15 seconds, no saline instillation. MDI: slow deep breath, hold 10 seconds; bronchodilator first, wait five minutes, then the steroid, then rinse. DPI: do not shake, inhale fast.



Blow three times, standing, before the bronchodilator; record the highest.

Zones are percentages of the patient's own best. For a best of 450, the yellow line is 360 and the red line is 225. Teach the numbers, not just the colors.

LOCK THESE IN

- Obstruction = failed exhalation and air trapping. Tripod position is compensation.
- Silent chest or normal $PaCO_2$ in a struggling asthmatic: impending failure.
- FEV1/FVC below 0.70 = COPD. Bronchodilator rise of 12% and 200 mL = asthma pattern.
- Peak flow: green 80 to 100%, yellow 50 to 79%, red below 50%.
- SABA is rescue; ICS has no acute effect; LABA never alone in asthma.
- COPD SpO_2 target 88 to 92%; oxygen at least 15 h/day for survival benefit.
- CF order: bronchodilator, mucolytic, clearance, inhaled antibiotic.
- Suction: preoxygenate, 80 to 120 mm Hg, 10 to 15 s, no saline.

Asthma versus COPD

Feature	Asthma	COPD
Onset	Childhood or young adult	Usually after 40, after exposure
Reversibility	Largely reversible	Persistent; ratio stays below 0.70
Pattern	Episodic, nocturnal	Progressive, daily, worse mornings
Oxygen target	93 to 95%	88 to 92% if chronically hypercapnic
Cornerstone drug	Inhaled corticosteroid	LAMA and/or LABA

GOLD grades and long-term oxygen

Item	Value
GOLD 1 (mild)	FEV1 80% of predicted or more
GOLD 2 (moderate)	FEV1 50 to 79%
GOLD 3 (severe)	FEV1 30 to 49%
GOLD 4 (very severe)	FEV1 below 30%
Oxygen indication	PaO_2 55 or less or SpO_2 88% or less; or PaO_2 56 to 59 with cor pulmonale or Hct over 55%
Oxygen dose	At least 15 hours a day

Oxygen devices

Device	Flow	FiO_2	Note
Nasal cannula	1 to 6 L/min	24 to 44%	Humidify above 4 L
Simple mask	6 to 10 L/min	35 to 50%	Never below 5 L (rebreathing CO_2)
Partial rebreather	6 to 11 L/min	60 to 75%	Bag at least one third full on inspiration
Non-rebreather	10 to 15 L/min	Up to about 90%	Inflate bag first; never let it collapse
Venturi	Per adapter	24 to 60%, precise	Choice when exact FiO_2 matters
High-flow cannula	Up to 60 L/min	21 to 100%	Heated, humidified

Worked cases

WORKED CASE 1 · STAGING COPD FROM SPIROMETRY

Mr. Tolliver, 64, smoked 1.5 packs a day for 30 years. After bronchodilator: FEV1 1.8 L, FVC 3.2 L, predicted FEV1 3.6 L.

STEP 1 · PACK-YEARS

1.5 x 30 = **45 pack-years**.

THE RATIO

FEV1/FVC = 1.8 ÷ 3.2 = 0.56, below 0.70: persistent obstruction, COPD.

THE GRADE

FEV1 percent predicted = 1.8 ÷ 3.6 = 50%, which is GOLD 2 (50 to 79%).

TEACH

Smoking cessation is the only intervention that slows his yearly FEV1 loss. Offer it every admission without lecturing.

WORKED CASE 2 · A BRONCHODILATOR RESPONSE

Ms. Akers, 23, has an FEV1 of 2.10 L before albuterol and 2.42 L fifteen minutes after.

STEP 1 · CHANGE IN VOLUME

2.42 minus 2.10 = 0.32 L = **320 mL**.

STEP 2 · PERCENT CHANGE

0.32 ÷ 2.10 = **15.2%**.

STEP 3 · INTERPRET

Both thresholds are met (at least 12% and at least 200 mL): a significant response that supports asthma.

WORKED CASE 3 · PEAK FLOW ZONES

Ms. Akers's personal best is 450 L/min. Tonight she blows 300.

STEP 1 · SET THE LINES

Green starts at 80%: 450 x 0.8 = 360. Red starts below 50%: 450 x 0.5 = 225.

STEP 2 · PLACE HER

300 ÷ 450 = 67%, in the yellow zone.

STEP 3 · ACT

Use the reliever and follow the written plan; call the provider if she does not return to green.

WORKED CASE 4 · TWO GASES THAT LOOK CALM

Patient A, asthma, RR 34, three-word sentences: pH 7.37, $PaCO_2$ 42. Patient B, long-standing COPD, comfortable at baseline: pH 7.36, $PaCO_2$ 58, HCO_3 32.

STEP 1 · READ A

A struggling asthmatic should be blowing off CO_2. A normal $PaCO_2$ means she is tiring: ominous.

STEP 2 · READ B

Both values abnormal with a normal pH: compensated respiratory acidosis, likely his baseline.

STEP 3 · PRIORITIZE

See **A** first: call for help, continuous bronchodilator, prepare for intubation. B needs comparison with prior gases, not urgent treatment.

TRAPS PEOPLE FALL INTO

- **Charting a silent chest as clear lungs.** No sound may mean no airflow.
- **Relaxing at a normal $PaCO_2$ in a tachypneic asthmatic.** It signals fatigue and coming failure.
- **Turning up oxygen for a comfortable COPD patient at 89%.** That may be baseline. Mental status and work of breathing matter more.
- **Withholding oxygen from a hypoxemic COPD patient.** Give what is needed, then titrate down and watch.

- **Using tiotropium or an ICS as a rescue inhaler.** Only a short-acting reliever rescues.
- **Giving the inhaled antibiotic first in CF.** It lands on mucus and gets cleared out. Open, thin, clear, then treat.
- **Instilling saline before suctioning.** It does not thin secretions and pushes bacteria deeper.
- **A speaking valve on an inflated cuff.** The patient cannot exhale. The cuff must be fully deflated.

Chapter 6 self-test · ten items

1. A patient with asthma who was wheezing loudly is now quiet, drowsy and tachypneic. What does this mean?

A. The albuterol has worked
B. The asthma attack is now resolving
C. Impending respiratory arrest
D. The patient is resting

C. Impending respiratory arrest Wheezing needs airflow. A silent chest with distress means too little air is moving.

2. Which spirometry result confirms COPD?

A. FEV1/FVC 0.62 after bronchodilator
B. FEV1 up 15% after albuterol
C. FEV1/FVC 0.82 with low volumes
D. Peak flow at 85% of personal best value

A. FEV1/FVC 0.62 after bronchodilator A post-bronchodilator ratio below 0.70 shows persistent obstruction.

3. Which inhaler should a patient use during an asthma attack?

A. Fluticasone
B. Albuterol
C. Salmeterol
D. Tiotropium

B. Albuterol A short-acting beta2 agonist acts within five minutes. The others are maintenance drugs.

4. What should a patient do after using an inhaled corticosteroid?

A. Hold breath 30 seconds
B. Use it again at once
C. Lie flat for 10 minutes
D. Rinse and spit

D. Rinse and spit Rinsing prevents oral thrush and hoarseness.

5. A personal best is 400 L/min. A reading of 180 L/min falls in which zone?

A. Red zone
B. Yellow zone
C. Green zone
D. Blue zone

A. Red zone 180 ÷ 400 = 45%, below 50%: red.

6. What SpO_2 target fits a COPD patient with chronic CO_2 retention?

A. 93 to 95%
B. 88 to 92%
C. 96 to 100%
D. 80 to 85%

B. 88 to 92% Higher saturations can worsen hypercapnia in chronic retainers.

7. In CF airway care, which comes first?

A. Inhaled tobramycin
B. Chest vest therapy
C. Bronchodilator
D. Dornase alfa

C. Bronchodilator Open the airway first, then thin, clear and treat.

8. What is the safe wall suction range for an adult?

A. 150 to 200 mm Hg
B. 40 to 60 mm Hg
C. 200 to 250 mm Hg
D. 80 to 120 mm Hg

D. 80 to 120 mm Hg Higher pressures injure the mucosa.

9. A post-op patient with sleep apnea is on opioids. Which is the best plan?

A. Own CPAP and oximetry
B. Supine and flat in bed
C. Extra sedative at night
D. Vital signs every 8 hours

A. Own CPAP and oximetry Use the CPAP whenever asleep, continuous oximetry, the head up and a lateral position.

10. Which task may the RN delegate to a UAP?

A. Teaching inhaler technique
B. Titrating oxygen flow
C. Care of a fresh tracheostomy stoma
D. Measuring SpO_2 and reporting it

D. Measuring SpO_2 and reporting it The UAP reports the number; the RN interprets, teaches and titrates.

ONE PAGE

Cram sheet

Everything from chapters 5 and 6 in one place. Cover the right column and see if you can rebuild each row.

Numbers to know

Item	Value	Note
Fever	38.3 °C once or 38.0 °C for 1 h	Older adults: over 37.2 oral or 1.1 °C above baseline
Lactate	Over 2 warning; 4 or more hypoperfusion	Repeat in 2 to 4 h if over 2
Bands	Over 10% is a left shift	Can occur with a normal WBC
ANC	Under 1,500 neutropenia; under 500 severe; under 100 profound	WBC x (% segs + % bands)
Sepsis bundle	Antibiotic within 1 h; 30 mL/kg crystalloid; MAP 65	Hgb transfusion threshold 7; glucose 180 or less
Cultures	2 sets, 2 sites, 8 to 10 mL per bottle	Do not delay antibiotics past about 45 min
Hub scrub	At least 15 seconds	Transparent dressing every 7 days
ABG	pH 7.35 to 7.45; $PaCO_2$ 35 to 45; HCO_3 22 to 26; PaO_2 80 to 100	$EtCO_2$ 35 to 45
Spirometry	COPD ratio below 0.70; asthma response 12% and 200 mL	GOLD by FEV1 % predicted
Peak flow	Green 80 to 100; yellow 50 to 79; red under 50%	Of personal best
Oxygen targets	Asthma 93 to 95%; COPD retainer 88 to 92%	LTOT at least 15 h/day
Magnesium in status asthmaticus	2 g IV over 20 min	Watch BP and reflexes
Suction	80 to 120 mm Hg; 10 to 15 s; 2 to 3 passes	Catheter no more than half the airway diameter
Trach cuff	20 to 25 cm H_2O	Speaking valve only with cuff deflated

Key terms and comparisons

Term	Meaning
Sepsis vs septic shock	Organ dysfunction from infection; plus pressors for MAP 65 and lactate over 2 after fluids
Colonization vs infection	Presence; presence plus host response
Allergy vs intolerance	Hives, wheeze, angioedema, hypotension; nausea or a predictable side effect
Negative vs positive pressure	Protects the unit from the patient; protects the patient from the unit
Emphysema vs chronic bronchitis	Destroyed walls and recoil; mucus, early hypoxemia, cor pulmonale
Wheeze vs rhonchi vs crackles	Narrow airway; secretions that clear with cough; fluid or opening alveoli
MDI vs DPI	Shake, slow deep breath; no shake, fast forceful breath

Rules that are not equations

Topic	The rule
Hour-1 order	Oxygen, access, lactate and cultures, antibiotic, fluids, pressor, reassess.
Neutropenic fever	Notify, culture every lumen, antipseudomonal beta-lactam within 60 min; no rectal route.
C. difficile	Contact plus, soap and water, bleach, oral vancomycin or fidaxomicin, no loperamide.
Status asthmaticus	Upright, O_2, continuous albuterol plus ipratropium, steroids early, stay; no sedatives or beta blockers.
COPD exacerbation	Bronchodilators, 5 days steroids, antibiotics when indicated, controlled O_2, BiPAP for hypercapnia.
Inhaler order	Bronchodilator, wait 5 min, then steroid, then rinse.
Respiratory priority	Stridor beats a silent chest, which beats loud wheezing, which beats a routine inhaler.
Delegation	UAP measures and reports SpO_2; RN assesses, teaches, titrates oxygen.

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