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F.A. Davis Company • Philadelphia

F. A. Davis Company
1915 Arch Street
Philadelphia, PA 19103
www.fadavis.com

Printed in China by Imago

Last digit indicates print number: 10 9 8 7 6 5 4 3 2 1

Publisher, Nursing: Robert G. Martone
Director of Content Development: Darlene D. Pedersen
Project Editor: Christina C. Burns
Art and Design Manager: Carolyn O'Brien
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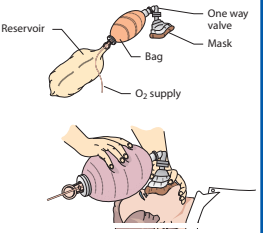
Oxygen Delivery Equipment

Device	Flow Rate in Liters/minute	Percent FiO_2 delivered
Nasal Cannula • Indicated for low-flow, low-percentage supplemental oxygen. • Flow rate of 1–6 L/min. • Delivers 25%–45% oxygen. • Pt can eat, drink, and talk. • Extended use can be very drying; use with a humidifier.	1	25%
	2	29%
	3	33%
	4	37%
	5	41%
	6	45%
Simple Face Mask • Indicated for higher percentage supplemental oxygen. • Flow rate of 6–10 L/min. • Delivers 35%–60% oxygen. • Lateral perforations permit exhaled CO_2 to escape. • Permits humidification.	6	35%
	7	41%
	8	47%
	9	53%
	10	60%
Nonrebreather Mask • Indicated for high percentage FiO_2. • Incorporates use of reservoir bag. • Flow rate of 10–15 L/min. • Delivers up to 100% oxygen. • One-way flaps prevent entrainment of room air during inspiration and retention of exhaled gases (namely CO_2) during expiration.	10–15	80%–100%*
	* Both flaps removed results in lower (80%–85%) FiO_2.	
	* One flap removed results in higher (85%–90%) FiO_2.	
	* Both flaps in place results in maximum (95%–100%) FiO_2.	
Venturi Mask (venti-mask) • Indicated for precise titration of percentage of oxygen. • Flow rate of 4–8 L/min. • Delivers 24%–60% oxygen. • Uses either a graduated dial set to desired FiO_2 or colored adapters selected to deliver desired FiO_2.	Blue	24%
	White	28%
	Orange	31%
	Yellow	35%
	Red	40%
	Green	60%

Continued

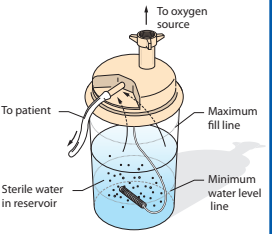
Bag-Valve-Mask (BVM)

- Indicated for manual ventilation of Pt who has no or ineffective respirations.
- Can deliver 100% oxygen when connected to oxygen source.
- Appropriate mask size and fit are essential to create good seal and prevent injury.
- To create seal, hold mask with thumb and index finger; grasp underneath ridge of jaw with remaining three fingers.



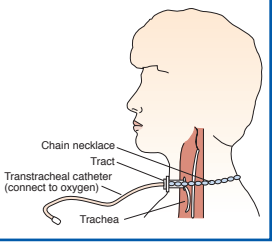
Humidified Systems

- Indicated for Pts requiring long-term oxygen therapy to prevent drying of mucous membranes.
- Setup may vary between brands. Fill canister with sterile water to recommended level, attach to oxygen source, and attach mask or cannula to humidifier.
- Adjust flow rate.



Transtracheal Oxygenation

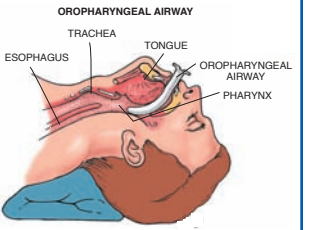
- Indicated for Pts with a tracheostomy who require long-term oxygen therapy and/or intermittent, transtracheal aerosol treatment.
- Ensure proper placement (over stoma, tracheal tube).
- Assess for and clear secretions as needed.
- Assess skin for irritation.



Artificial Airways

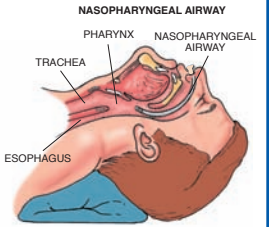
Oropharyngeal Airway (OPA)

- Indicated for unconscious Pts who do not have a gag reflex.
- Measure from corner of mouth to earlobe.
- Insert upside down and rotate 180 degrees. Use method below for small children.
- Alternative method (all ages): Use tongue depressor, insert right side up, follow normal curve of oral cavity.



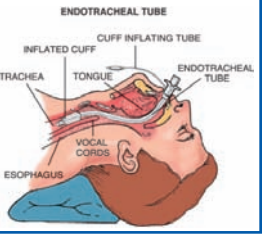
Nasopharyngeal Airway (NPA)

- Indicated for Pts with a gag reflex, or comatose with spontaneous respirations.
- Measure from tip of Pt's nose to earlobe.
- Diameter should match Pt's smallest finger.
- NEVER insert nasal airway in presence of facial trauma!



Endotracheal Tube (ETT)

- Indicated for apnea, airway obstruction, respiratory failure, risk of aspiration, or therapeutic hyperventilation.
- Can be inserted through mouth or nose.
- Inflated cuff protects Pt from aspiration.



Pulse Oximetry

SpO_2	Nursing Intervention
>95%	• Considered normal and generally requires no invasive intervention.* • Continue routine monitoring of Pt.
91%–94% NCLEX	• Considered borderline.* • Assess probe placement and adjust if necessary. • Begin oxygen at 2 L/min titrated to SpO_2 >95%.
85%-90% NCLEX	• Immediate intervention for SpO_2 <91%. Elevate head and encourage Pt to cough and breathe deeply. • Assess airway and suction as needed. • Administer oxygen and titrate to SpO_2 >95%. • If condition worsens or fails to improve, assist ventilations manually and prepare to intubate.
<85%	• Administer 100% oxygen, set Pt upright, encourage coughing and deep breathing and suction as needed. • Assist ventilations manually and prepare to intubate if condition worsens or fails to improve. • Consider reversal agents for possible drug-induced respiratory depression.

*Consider readings within overall context of Pt's medical history and physical examination. NEVER withhold treatment based solely on a "normal" SpO_2 reading (e.g., a Pt who is hypovolemic may have a normal SpO_2, which may mislead you to overlook a potentially fatal condition).

Conditions That May Produce False SpO_2 Readings

False Highs	False Lows
• Anemia. • Alkalosis. • CO (carbon monoxide) poisoning. • Hypovolemia. • Pt movement.	• Cool extremities. • Drugs (vasoconstrictors). • Nail polish/nail infection. • Pt movement. • Poor peripheral circulation. • Reynaud's disease.

Ventilated Patient in Distress

Patient in Sudden, Severe Respiratory Distress

- Disconnect ventilator tubing from ET tube and manually ventilate Pt.
- Have RT/physician notified STAT.

Patient Is Easy to Manually Ventilate

- Ventilator is probable source of problem. Notify RT.
- While you manually ventilate Pt, RT should assess ventilator.
- Ventilator may need to be changed if problem cannot be found.

Patient Is Difficult to Manually Ventilate

Dislodgement

- If tube is dislodged, remove and manually ventilate Pt.
- Suction oropharynx to clear secretions.
- Notify RT/physician STAT and assist with reintubation.

Obstruction

- Suction ET tube to clear secretions. Notify RT.
- If unable to clear obstruction or pass suction catheter, extubate and manually ventilate (suction oropharynx as needed to clear secretions).
- Notify RT/physician STAT and assist with reintubation.

Pneumothorax

- If ineffective ventilation continues after airway, ET, and ventilator are all determined to be patent, inspect and auscultate Pt's chest.
- If there is unequal chest wall movement and/or decreased air movement on one side, it may be related to a tension pneumothorax (other causes may include an incorrectly positioned ET tube or atelectasis).
- Notify RT/physician STAT.

Equipment

- Inspect cuff for air leak (check cuff pressure if manometer available).
- Notify RT/physician if air leak cannot be fixed.

Note: If ineffective ventilation continues and no physical or mechanical cause can be found, consider sedating Pt.

Troubleshooting Ventilator Alarms

- **When ventilator alarms:** Check Pt first. If Pt is in no apparent distress, check ventilator to determine source of problem.
- **Pt in distress:** Try to calm Pt. If unsuccessful, immediately disconnect Pt from vent and manually ventilate with 100% oxygen using BVM.
- Notify RT/physician STAT (see previous page).

Ventilator Alarm	Nursing Intervention
NCLEX **Low-Pressure** Usually caused by system disconnect or leaks.	• Reconnect Pt to ventilator. • Evaluate cuff and reinflate if needed (if ruptured, tube must be replaced). • Evaluate connections and tighten or replace as needed. • Check ET tube placement (auscultate lung fields and assess for equal, bilateral breath sounds).
NCLEX **High-Pressure** Usually caused by resistance within system. Can be a kink or water in tubing, Pt biting tube, copious secretions, or plugged ETT.	• Suction Pt if secretions suspected. • Insert bite block. • Reposition Pt's head and neck, or reposition tube. • Sedation may be required to prevent Pt from fighting vent, but only after you exclude physical or mechanical causes.
High Respiratory Rate Can be caused by anxiety or pain, secretions in ETT/airway, or hypoxia.	• Suction Pt. • Look for source of anxiety (i.e., pain, environmental stimuli, inability to communicate, restlessness, etc.). • Evaluate oxygenation.
Low Exhaled Volume Usually caused by tubing disconnection or inadequate seal.	• Evaluate/reinflate cuff; if ruptured, ETT must be replaced. • Evaluate connections; tighten or replace as needed; check ETT placement, reconnect to ventilator.

Suctioning a Patient on the Ventilator

Preparation

- **Prepare Pt:** Explain procedure—offer reassurance.
- **Gather supplies:** Sterile gloves, sterile suction catheter and tubing, sterile normal saline, sterile basin, bag-valve mask connected to a supplemental oxygen source, suction source.
- **Equipment:** Ensure that wall or portable suction is turned on (no higher than 120 mm Hg) and position supplies and suction tubing so that they are easily accessible.
- **Wash hands:** Follow standard precautions.
- **Setup:** Using sterile technique, open and position supplies so they are within easy reach. Fill sterile basin with sterile normal saline and open sterile gloves close by so they are easy to reach.
- **Position yourself:** Stand at Pt's bedside so your nondominant hand is toward Pt's head.
- **Preoxygenate:** Manually ventilate Pt with 100% O_2 for several deep breaths.

Technique

- Don sterile gloves.
- Wrap sterile suction catheter around your dominant hand and connect it to suction tubing. Wrapping catheter around your hand prevents it from dangling and minimizes risk of contamination. Avoid touching your dominant hand with end of suction tubing.
- **Note:** Your nondominant hand is no longer sterile and must not touch any part of catheter or your dominant hand.
- Insert suction catheter just far enough to stimulate a cough reflex.
- Apply intermittent suction while withdrawing catheter and rotating 360° for no longer than 10–15 sec to prevent hypoxia.
- Manually ventilate with 100% O_2 for several deep breaths.
- Repeat until Pt's airway is clear.
- Suction oropharynx after suctioning of airway is complete.
- Rinse catheter in basin with sterile saline in between suction attempts (apply suction while holding tip in saline).
- Rinse suction tubing when done and discard soiled supplies.

Troubleshooting Tracheotomies

NCLEX Dislodgement

If Tracheostomy Is Less Than 4 Days Old

- STAT intervention is required because tract can collapse suddenly.
- Notify physician and RT STAT.
- Only trained personnel should replace new tracheostomy tube.
- Open tracheostomy with a sterile hemostat, suction catheter, or sterile gloved finger to maintain airway and to keep edges of tracheostomy from collapsing.
- If Pt cannot breathe, ventilate using BVM.
- If you cannot be sure someone clinically prepared to reinsert tracheostomy tube will arrive within 1 minute, call a Code.

If Tracheostomy Is More Than 4 Days Old

- Tract will be well formed and will not close quickly.
- Notify physician and RT that tube needs to be replaced.
- Obtain replacement tube, if not already at Pt's bedside.
- Stay with Pt and prepare for insertion of new tube.

Troubleshooting Chest Tubes

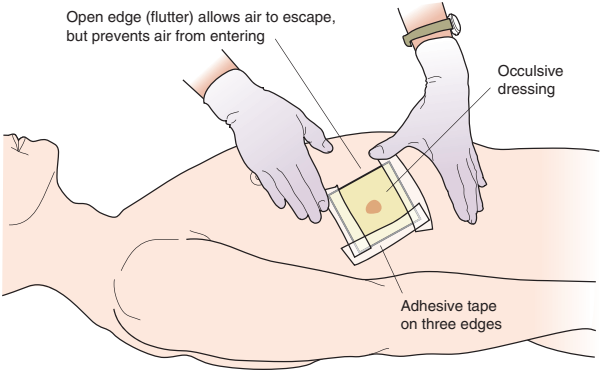
NCLEX Air Leak

Continuous bubbling in water seal chamber suggests an air leak, either in Pt or in drainage system. Possible causes include disconnection or break in drainage system, incomplete seal around tube at insertion site, or improperly inserted tube. Notify physician, and check Pt and system for source of air leak.

- Briefly occlude tube by pinching tubing close to chest wall. A cessation of bubbling suggests air leak is within Pt at insertion site.
- If bubbling continues, assess insertion site to see if air is entering around wound. Using both hands, apply pressure around insertion site. If bubbling stops or decreases with pressure, consult physician about replacing dressing with another pressure dressing. Suture may be required around tube.
- If neither measure decreases bubbling, air leak may be in tubing and/or connections. Secure and retape all connections.
- If air leak is still present, change out drainage system.

NCLEX Chest Tube Becomes Dislodged From Patient

- Immediately cover chest tube insertion site with sterile occlusive dressing (petroleum gauze) reinforced with several 4×4 pads.
- Tape three sides of dressing, leaving one side open for air to escape.
- Notify RT/physician STAT.
- Stay with Pt and monitor for signs of respiratory distress.



NCLEX Chest Tube Disconnection From Drainage Unit

- Do one of three things while preparing to reattach tubes: (1) Leave tube open to air, (2) Submerge distal end of tube under 1–2 inches of sterile water or normal saline (essentially, a water seal), or (3) Attach a one-way (Heimlich) valve.
- Clean both exposed ends with Betadine swabs for 30 sec and let air dry for 30 sec. Reconnect drainage system and retape with fresh, waterproof tape.
- If tube connections have been grossly contaminated (i.e., with feces, urine, etc.), a new drainage system including sterile connector must be attached. This must be done as quickly as possible to prevent respiratory distress due to possible pneumothorax.

NG (Nasogastric) Tube—Insertion

- **Explain** procedure to Pt and offer reassurance.
- **Auscultate** abdomen for positive bowel sounds if NG tube is to be used for administration of feedings or medication.
- **Position** Pt upright in high-Fowler's. Instruct Pt to keep chin-to-chest posture during insertion. This helps prevent accidental insertion into trachea.
- **Measure** tube from tip of nose to earlobe, then down to xiphoid. Mark this point on tube with tape.
- **Lubricate** tube with water-soluble lubricant. Never use petroleum-based jelly, which degrades PVC tubing.
- **Insert** tube through nostril until you reach previously marked point on tube. Instruct Pt to take small sips of water during insertion to help pass tube.
- **Secure** tube to Pt's nose using tape. Be careful not to block nostril. Tape tube 12–18 inches below insertion line and then pin tape to Pt's gown. Allow slack for movement.
- NCLEX Salem sump: keep air vent unclamped and above level of stomach.
- **Position** HOB at 30°–45° to minimize risk of aspiration.
- **Assemble** equipment (wall suction, feeding pump, etc.).
- Document type and size of NG tube, which nostril, how Pt tolerated procedure, how tube placement was confirmed, and whether tubing was left clamped or attached to feeding pump or suction.

NG Tube—Confirming Proper Placement

- Pull back on plunger* of a 20-mL syringe to aspirate stomach contents. Typically, gastric aspirates are cloudy and green, or tan, off-white, bloody, or brown. Gastric aspirate can look like respiratory secretions, so it is best also to check pH.
- Dip litmus paper into gastric aspirate. A reading of a pH of 1–3 suggests placement in stomach.

- An alternative, but less reliable, method is to inject 20 mL of air into tube while auscultating abdomen. Hearing loud gurgle of air suggests placement in stomach. If no bubbling is heard, remove tube and reattempt. Withdraw tube immediately if Pt becomes cyanotic or develops breathing problems.
- Inability to speak suggests intubation of trachea.

***Note:** small-bore NI (nasointestinal) tubes (i.e., Dobhoff) may collapse under pressure, and initial confirmation of placement is obtained by x-ray.

NG Tube—Care and Removal

Patient Care

- NCLEX Reassess placement of tube before administering bolus feedings, fluids, or meds and at every shift for continuous feedings.
- Flush tube with 30 mL of water after each feeding and after each administration of medication.
- Assess for skin irritation or breakdown. Retape daily and at alternate sites to avoid constant pressure on one area of nose. Gently wash around nose with soap and water. Provide nasal hygiene daily and prn.
- Provide good oral hygiene every 2 hours and prn (mouth wash, water, toothettes → clean tongue, teeth, gums, cheeks, and mucous membranes). If Pt is performing oral hygiene, remind him or her not to swallow any water.

Removal

- Explain procedure to Pt. Observe standard precautions.
- Remove tape from nose and face.
- Clamp or plug tube (prevents aspiration), instruct Pt to hold breath, and remove tube in one gentle, but swift motion.
- Assess for signs of aspiration.

NG Tube Feedings

- Always confirm placement before each use (see **Confirming Proper Placement of NG Tube** on p. 10.
- **Maintenance:** Flush with 30 mL of water every 4–6 hours and before and after tube feedings, checking for residuals, and administering medications.
- **Medication:** Dilute liquid medications with 20–30 mL of water. Obtain all medications in liquid form. If liquid form is not available, check with pharmacy to see if medication can be crushed. Administer each medication separately and flush with 5–10 mL of water between each medication. Do not mix medications with feeding formula!
- **Residuals:** Check before bolus feeding, administration of medication, or every 4 hours for continuous feeding. Hold feeding if >100 mL and recheck in 1 hour. If residuals are still high after 1 hour, notify physician.

Types of Tube Feedings

- **Initial tube feedings:** Advance as tolerated by 10–25 mL/hour every 8–12 hours until goal rate is reached.
- **Intermittent:** Infusions of 200–400 mL of enteral formulas several times per day infused over a 30-minute period.
- **Continuous:** Feedings initiated over 24 hours using an infusion pump.

Checking Residuals

- Using 60-mL syringe, withdraw from gastric feeding tube any residual formula that may remain in stomach.
- Volume of this formula is noted, and if it is greater than predetermined amount, stomach is not emptying properly, and next feeding dose is withheld.
- This process can indicate gastroparesis and intolerance to advancement to higher volume of formula.

NCLEX Tube Feeding Complications

Complication	Common Causes and Interventions
Nausea, vomiting, or bloating	• **Large residuals:** Withhold or decrease feedings. • **Medication:** Review meds and consult physician. • **Rapid infusion rate:** Decrease rate.
Diarrhea	• **Too rapid administration:** Reduce rate. • **Refrigerated TF:** Administer at room temp. • **Tube migration into duodenum:** Retract tube to reposition in stomach and reconfirm placement.
Constipation	• **Decreased fluid intake:** Provide adequate hydration. • **Decreased dietary fiber:** Use formula with fiber.
Aspiration and gastric reflux	• **Improper tube placement:** Verify placement. • **Delayed gastric emptying:** Check residuals. • **Positioning:** Keep HOB elevated 30°–45°.
Occluded tube	• **Inadequate flushing:** Flush more routinely. • **Use of crushed meds:** Switch to liquid meds.
Displaced tube	• **Improperly secured tube:** Retape tube. • **Confused Pt:** Follow hospital protocol.

Ostomy Care

Types of Ostomies

- **Colostomy:** May be permanent or temporary. Used when only part of large intestine is removed. Commonly placed in sigmoid colon, stoma is made from large intestine and is larger in appearance than an ileostomy. Contents range from firm to fully formed.
- **Ileostomy:** May be permanent or temporary. Used when entire large intestine is removed. Stoma is made from small intestine and is smaller than a colostomy. Contents range from paste-like to watery.
- **Urostomy:** Used when urinary bladder is either bypassed or must be removed altogether.

Procedure for Changing an Ostomy Bag

- Explain procedure to Pt.
- Gather supplies.
- Place Pt in supine position.
- Wash hands and observe standard precautions (don gloves).
- Remove old pouch by gently pulling away from skin.
- Discard gloves, wash hands, and don new pair of gloves.
- Wash area around stoma with warm, soapy water, then dry skin thoroughly.
- Inspect appearance of stoma and condition of skin, and note amount, color, consistency of contents, and presence of unusual odor (note: normal-looking stoma should be pink-red, and peristomal skin should be free from any redness or ulceration).
- Cover exposed stoma with gauze pad to absorb any drainage.
- Apply skin prep in circular motion; allow to air-dry for 30 sec.
- Apply skin barrier in circular motion.
- Measure stoma using stoma guide and cut ring to size.
- Remove paper backing from adhesive-backed ring, and, using gentle pressure, center ring over stoma and press it to skin.
- Smooth out any wrinkles to prevent seepage of effluent.
- Center faceplate of bag over stoma and gently press down until closed.
- Document appearance of stoma, condition of skin, amount, color, and consistency of contents, and presence of any unusual odor.
- Discard soiled items per hospital policy using standard precautions.

Urinary Catheters

Straight Catheter

- Also called a **red rubber** catheter or "**straight cath**." Straight catheters have only a single lumen and do not have a balloon near the tip. Straight catheters are inserted for only as much time as it takes to drain bladder or obtain a urine specimen.

Indwelling Catheter

- Also called a **Foley** or **retention** catheter. Indwelling catheters have two lumens, one for urine drainage and another for inflation of the balloon near the tip. **Three-Way** Foley catheters are used for continuous or intermittent bladder irrigation. They have a third lumen for irrigation.

Procedure for Insertion

- Prepare Pt; explain procedure, provide privacy and collect equipment.
- Place Pt in supine position (Female: knees up, legs apart; Male: legs flat, slightly apart).
- Open and set up catheter kit using sterile technique.
- Don sterile gloves and set up sterile field.
- If placing indwelling catheter, check for leaks and proper inflation of balloon by filling with 5 mL of sterile water. Remove water.
- Lubricate catheter tip; saturate cotton balls with cleansing solution.
- With nondominant hand (now contaminated), and using dominant (sterile) hand to hold swabs with sterile forceps; **Female:** hold labia apart; swab from front to back, in following order: (1) labia farthest from you, (2) labia nearest to you, (3) center of meatus between labia. Use one swab per swipe; **Male:** retract foreskin; swab in a circular motion from meatus outward. Repeat three times, using a different swab each time.
- Gently insert catheter (about 2–3 inches for females and 6–9 inches for males) until return of urine is noted. **Straight catheters:** collect specimen or drain bladder and remove and discard catheter. **Indwelling catheters:** insert an additional inch and inflate balloon.
- Attach catheter to drainage bag using sterile technique.
- Secure catheter to Pt's leg according to hospital policy.
- Hang drainage bag on bed frame below level of the bladder.
- Document type and size of catheter, amount and appearance of urine, and how Pt tolerated procedure.

Urinary Catheters—Care and Removal

Routine Catheter Care

- Keep bag below level of Pt's bladder at all times.
- Ensure tubing is free of kinks or loops and that Pt is not lying on it.
- Do not pull or tug on catheter.
- Wash around catheter entry site with soap and water twice each day and after each bowel movement.
- Do not use powder around catheter entry site.
- Periodically check skin around catheter entry site for signs of irritation (redness, tenderness, swelling, or drainage).
- Offer fluids frequently (if not contraindicated by health status).
- Record urine output and empty collection bag every shift or per physician orders; note color, clarity, odor, and presence of sediment.
- **Notify physician of any of the following:**
  - Blood, cloudiness, or foul odor.
  - Decreased urine output (<30 mL/hour)—order a bladder scan.
  - Irritation, redness, tenderness, swelling, drainage, or leaking.
  - Fever, or abdominal or flank pain.

Procedure for Removal

- Don gloves and observe standard precautions.
- Use a 10-mL syringe to withdraw all water from balloon. Some catheter balloons are overinflated or have up to a 30-mL balloon; withdraw and discard water until no more water can be removed.
- Hold a clean 4×4 at meatus with nondominant hand. With dominant hand, gently pull catheter. If you meet resistance, stop and reassess if balloon is completely deflated. If balloon appears to be deflated and catheter cannot be removed easily, notify physician.
- Wrap tip in clean 4×4 as it is withdrawn to prevent leakage of urine. Use a sterile 4×4 if a culture of catheter tip is desired.
- Note time that catheter was discontinued.
- Provide bedpan, urinal, or assistance to bathroom as needed.
- Document time of removal and how Pt tolerated procedure.
- Document amount and time of spontaneous void.
- If Pt does not void within 8 hours, palpate bladder or obtain bladder volume using a bladder scanner and notify physician. Catheter may need to be reinserted.

Bladder Scanners

Indications

- Determine bladder volume.
- Assess for urinary retention or post-void residuals.
- Prevent urinary retention following removal of indwelling catheter.
- Assist with bladder retraining.

Contraindications

- Pregnancy.
- Abdominal wound over area to be scanned.

Procedure

- Explain procedure and provide privacy.
- Observe standard precautions.
- Place Pt in a supine position.
- Expose lower abdominal area and apply ultrasound transmission gel to midline, superior to symphysis pubis.
- Select gender (note: select male for women with hysterectomy).
- Perform scan per manufacturer's guidelines.
- Clean scanner head and equipment per manufacturer's guidelines.
- Clean remaining gel from Pt's abdomen and assist as needed.
- Document recorded volume and notify physician as indicated.

Specimen Collection

Blood Sample (Venipuncture)

- Verify if Pt has allergies to latex, iodine, or adhesives.
- A tourniquet should not be left in place longer than 1 minute.
- Previous puncture site areas should be avoided for 24–48 hours.
- NCLEX Specimens should never be collected above an IV site.

Procedure

- **Prepare Pt:** Explain procedure and offer reassurance.
- **Supplies:** Tourniquet, skin cleanser, sterile 2×2 gauze, evacuated collection tubes or syringes, needle and needle holder, and tape.

- **Position Pt:** Sitting or lying with arm extended and supported.
- **Tourniquet:** 3–4 inches above intended venipuncture site.
- **Cleanse site:** Briefly remove tourniquet. With an alcohol swab, cleanse site from center out using a circular motion. Allow site to air-dry for 30–60 sec. Use iodine for blood alcohol level and blood culture specimens.
- **Perform venipuncture:** Reapply tourniquet. If necessary, cleanse end of gloved finger for additional vein palpation. Insert needle, bevel up, at 15°–30° using dominant hand. With nondominant hand, push evacuated collection tube completely into needle holder *or* pull back on syringe plunger with slow, consistent tension.
- **Remove tourniquet:** If procedure will last longer than 1 minute, remove tourniquet after blood begins to flow.
- **Remove needle:** Remove tourniquet if still in place. Place sterile gauze over puncture site, remove needle, and apply pressure.
- **Equipment disposal:** Per facility policy; use standard precautions.
- **Prepare specimen:** If using syringes, transfer specimen into proper tubes. Mix additives with a gentle rolling motion. Label specimen tubes with Pt's name, ID number, date, time, and your initials.
- **Document:** Record specimen collection in medical record.

Order of Laboratory Draw

Blood cultures	Green, orange, or yellow.
Discard tube	Red-top with no additive. Used when drawing a coagulation using a butterfly needle (to remove air in tubing) or when drawing from an IV.
Sodium citrate	Light blue. If using a butterfly, draw discard tube first.
Serum tube	Red, red marble, or gold (with or without gel separator or clot activator).
Heparin tube	Green, light green or green marble (with or without gel).
EDTA	Lavender, pink, white, royal blue, black, or tan.
Glycolytic inhibitor	Gray (sodium fluoride/potassium oxalate).
ACD tube	Yellow (solution A, then B).

Order of Draw concepts reprinted with permission from CLSI approved standard H3-A6, Procedures for the collection of diagnostic blood specimens by venipuncture, copyright 2007 (www.clsi.org).

NCLEX Arterial Puncture for Blood Gas Collection

- **Preferred site:** Radial artery. Ensure Pt has sufficient collateral circulation. NEVER perform in extremity with insufficient circulation!
- **Allen test:** Apply enough pressure to radial and ulnar arteries to occlude blood flow. Instruct Pt to clinch and release fist; hand should blanch. Release pressure over ulnar artery; flushing/return of color within 5 sec indicates sufficient collateral circulation.
- **Cleanse site:** Use alcohol (always follow facility guidelines).
- **Collect sample:** Hyperextend Pt's wrist using rolled towel. Palpate radial artery, enter artery (45°–90° angle, bevel up); syringe should fill spontaneously (3–5 mL desired); remove needle and hold pressure for 5 minutes (15–20 minutes if Pt is anticoagulated).
- **Prepare specimen:** Dispose of needle per standard precautions, cap syringe (blunt-tipped device), and expel air bubbles. Gently roll syringe to mix specimen with heparin, place on ice and transport to laboratory immediately. Laboratory slip must include oxygen administration (room air if Pt not on oxygen) and any ventilator settings if applicable.

Urine Sample

Random

- Indicated for routine screening and may be collected at any time.
- Instruct Pt to void into specimen container.

Clean-Catch (midstream)

- Indicated for microbiological and cytological studies.
- Wash hands thoroughly. **Males:** cleanse meatus, pull back foreskin; **Females:** cleanse labia and meatus from front to back.
- Void small amount into toilet. **Males:** keep foreskin pulled back; **Females:** hold labia apart; then void into specimen collection container without interrupting flow of urine. Secure lid tightly.

Catheterized Random/Clean Catch

- Ensure tubing is empty; clamp distal to collection port for 15 minutes.
- Cleanse collection port with antiseptic swab and allow to air-dry.
- Use needle and syringe to withdraw required amount of specimen.
- Remember to unclamp tubing.