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A Davis's Notes Book



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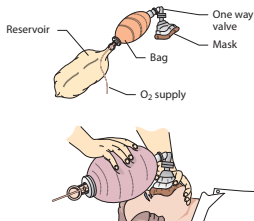
Oxygen Delivery Equipment

Device	Flow Rate in Liters/minute	Percent FiO ₂ delivered
Nasal Cannula <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Indicated for higher percentage supplemental oxygen. Flow rate of 6–10 L/min. Delivers 35%–60% oxygen. Lateral perforations permit exhaled CO₂ to escape. Permits humidification. 	6	35%
	7	41%
	8	47%
	9	53%
	10	60%
Nonrebreather Mask <ul style="list-style-type: none"> Indicated for high percentage FiO₂. 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 CO₂) 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) <ul style="list-style-type: none"> 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 FiO₂ or colored adapters selected to deliver desired FiO₂. 	Blue	24%
	White	28%
	Orange	31%
	Yellow	35%
	Red	40%
	Green	60%

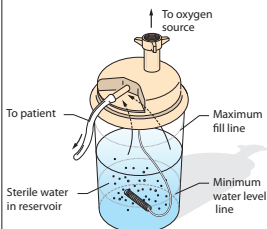
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Bag-Valve-Mask (BVM)

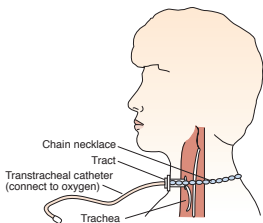
- Indicated for manual ventilation of Pt who has no or ineffective respirations.
- Can deliver 100% oxygen when connected to oxygen source.
- Appropriate mask size and fit are essential to create good seal and prevent injury.
- To create seal, hold mask with thumb and index finger; grasp underneath ridge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

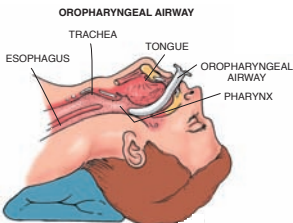
- Indicated for Pts with a tracheostomy who require long-term oxygen therapy and/or intermittent, transtracheal aerosol treatment.
- Ensure proper placement (over stoma, tracheal tube).
- Assess for and clear secretions as needed.
- Assess skin for irritation.



Artificial Airways

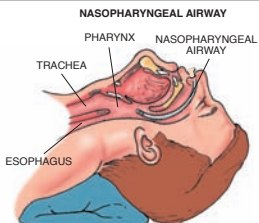
Oropharyngeal Airway (OPA)

- 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.



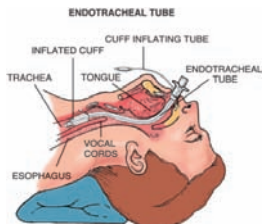
Nasopharyngeal Airway (NPA)

- 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%	<ul style="list-style-type: none"> • Considered normal and generally requires no invasive intervention.* • Continue routine monitoring of Pt.
91%–94% NCLEX	<ul style="list-style-type: none"> • Considered borderline.* • Assess probe placement and adjust if necessary. • Begin oxygen at 2 L/min titrated to SpO₂ >95%.
85%–90% NCLEX	<ul style="list-style-type: none"> • Immediate intervention for SpO₂ <91%. Elevate head and encourage Pt to cough and breathe deeply. • Assess airway and suction as needed. • Administer oxygen and titrate to SpO₂ >95%. • If condition worsens or fails to improve, assist ventilations manually and prepare to intubate.
<85%	<ul style="list-style-type: none"> • 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" SpO₂ reading (e.g., a Pt who is hypovolemic may have a normal SpO₂, which may mislead you to overlook a potentially fatal condition).

Conditions That May Produce False SpO₂ Readings

False Highs	False Lows
<ul style="list-style-type: none"> • Anemia. • Alkalosis. • CO (carbon monoxide) poisoning. • Hypovolemia. • Pt movement. 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • 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% O₂ 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% O₂ 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

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

Air Leak

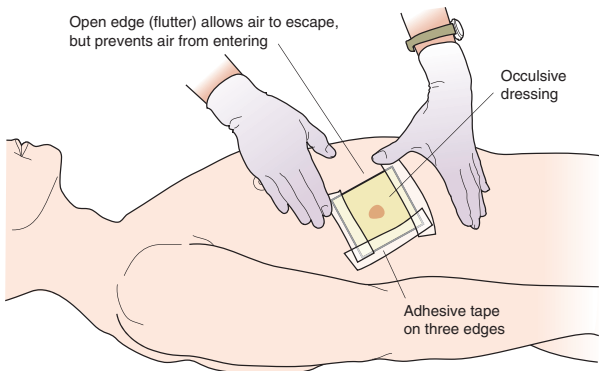
Continuous bubbling in water seal chamber suggests an air leak, either in Pt or in drainage system. Possible causes include disconnection or break in drainage system, incomplete seal around tube at insertion site, or improperly inserted tube. Notify physician, and check Pt and system for source of air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



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.



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.

Tube Feeding Complications

Complication	Common Causes and Interventions
Nausea, vomiting, or bloating	<ul style="list-style-type: none"> • Large residuals: Withhold or decrease feedings. • Medication: Review meds and consult physician. • Rapid infusion rate: Decrease rate.
Diarrhea	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Decreased fluid intake: Provide adequate hydration. • Decreased dietary fiber: Use formula with fiber.
Aspiration and gastric reflux	<ul style="list-style-type: none"> • Improper tube placement: Verify placement. • Delayed gastric emptying: Check residuals. • Positioning: Keep HOB elevated 30°–45°.
Occluded tube	<ul style="list-style-type: none"> • Inadequate flushing: Flush more routinely. • Use of crushed meds: Switch to liquid meds.
Displaced tube	<ul style="list-style-type: none"> • 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.
-  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).

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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.

First Morning

- Yields a very concentrated specimen for screening substances less detectable in a more dilute sample.
- Instruct Pt to void into specimen container upon awakening.

Second Void

- Instruct Pt to void, drink a glass of water, wait 30 minutes, and then void into a specimen collection container.

Timed (24-hour urine)


- Used to quantify substances in urine and to measure substances whose level of excretion varies over time.
- Ideally, collection should begin between 6:00 a.m. and 8:00 a.m.
- Keep specimen container refrigerated or on ice for entire collection period.
- Start time begins with collection and discard of first void. Instruct Pt to discard first void of day and record date and time on collection container.
- Add each subsequent void to collection container. Instruct Pt to void at same time following morning and add it to collection container.
- This is the end of the 24-hour collection period.
- Record date and time and send specimen to laboratory.

Timed (24-hour urine): Catheterized Patients

- Follows same guidelines as regular timed urine, but is started after bag and tubing have been replaced. This is the start time and should be recorded on collection container.
- Either collection bag is kept on ice, or specimen is emptied every 2 hours into collection container, which is refrigerated or kept on ice.
- At 24 hours, remaining urine is emptied into collection container.
- This is the end of the 24-hour collection period.
- Record date and time and send specimen to lab.

Sputum/Throat Culture

General Guidelines

- Use standard precautions when obtaining or handling specimen.
-  Cultures should be obtained prior to antimicrobial therapy.
- Document all specimen collections in medical record.

Expectorated Specimens

- Instruct Pt to brush teeth or rinse mouth prior to specimen collection to avoid contamination with normal oral flora.
- Assist Pt to upright position and provide over-bed table.
- Instruct Pt to take 2–3 deep breaths and then cough deeply.
- Sputum should be expectorated directly into a sterile container.
- **NCLEX** Label specimen container and immediately send to laboratory.

Throat Culture

- **Contraindicated in Pts with acute epiglottitis.**
- Instruct Pt to tilt head back and open mouth.
- Use tongue depressor to prevent contact with tongue or uvula.
- Using a sterile Culturette, swab both tonsillar pillars and oropharynx.
- Place Culturette swab into Culturette tube and squeeze bottom to release liquid transport medium.
- Ensure swab is immersed in liquid transport medium.
- Label specimen container—send to laboratory at room temperature.

Stool Sample

General Guidelines

- Use standard precautions when obtaining or handling specimen.
- The freshest sample possible will yield optimal results.
- Specimens should not contact urine or toilet water.
- Preservatives are poisonous; avoid contact with skin.

Occult Blood (Hemoccult, Guaiac)

- Open collection card.
- Obtain small amount of stool with wooden collection stick and apply onto area labeled box A.
- Use other end of wooden collection stick to obtain second sample from different area of stool and apply it onto area labeled box B.
- Close card, turn over and apply one drop of control solution to each box as indicated.
- A color change is positive, indicating blood in stool.
- **Note:** If Pt will be collecting specimens at home, instruct Pt to collect specified number of specimens, keep them at room temperature, and drop them off within designated time frame.
- Document results on Pt record and notify physician if indicated.

Cysts and Spores—Ova and Parasites

- Open collection containers.
- Using spoon attached to cap, place bloody or slimy/whitish (mucous) areas of stool into each container.
- Do not overfill containers.
 - Place specimen in empty container (clean vial) up to fill line and replace cap and tighten securely.
 - Place enough specimen in container with liquid preservative (fixative) until liquid reaches fill line; replace cap and tighten.
- Shake container with preservative until specimen is mixed.
- Write Pt identification information and date and time of collection on each container, keep at room temperature, and send specimens to laboratory immediately after collection.
- **Note:** If Pt will be collecting specimens at home, instruct Pt to collect specified number of specimens, keep them at room temperature, and drop them off within designated time frame.
- Document specimen collection in medical record.

Dressing Change

Nonsterile (Clean) Technique

- Wash hands, explain procedure, and position and drape Pt.
- Don clean (nonsterile) gloves and remove old dressing:
 - Pull tape toward incision, parallel to skin.
 - Be careful not to dislodge any drainage tubes or sutures.
- Assess condition and appearance of wound including size, color, and presence of exudate, odor, ecchymosis, or induration.
- Discard gloves and old dressing per standard precautions.
- Wash hands and don new gloves.
- Cleanse wound with prescribed solution:
 - Start from area of least contamination, and cleanse toward area of most contamination (separate swab for each stroke).
 - Cleanse around drains using circular motion working outward.
- Apply antiseptic/medicated ointments as prescribed.

- Apply prescribed sterile dressing to incision or wound:
 - Cut dressings to fit around drain if present (sterile scissors).
 - **Dry dressing:** Cover wound with sterile gauze (2×2, 4×4, etc.).
 - **Wet-to-dry:** Apply saline-moist, sterile gauze, and then cover with dry, sterile gauze (2×2, 4×4, etc.), thick ABD, or Surgi-Pad.
 - **Wound packing:** Soak sterile gauze in prescribed solution and ring out excess. Gently pack wound until all wound edges are in contact with moist gauze, including any undermined areas. Do not over-pack wound (stop at skin level).
- Reinforce with thick cover dressing (ABD or Surgi-Pad).
- Secure dressing with tape, rolled gauze, or Montgomery ties.
- Document dressing change and assessment findings.

Additional Steps for Sterile Dressing Changes

- Wear mask to prevent contamination of sterile field or wound.
- Open sterile gloves ahead of time on nearby surface.
- Using sterile technique, open supplies and set up sterile field.
- Instruct Pt not to touch incision/wound or sterile supplies.

Complete Health History

- **Biographical Data:** Record Pt's name, age, and date of birth, gender, race, ethnicity, nationality, religion, marital status, children, level of education, job, and advance directives.
- **Chief Complaint (subjective):** What the Pt tells you. Symptom analysis for chief complaint. Chief complaint should not be confused with medical diagnosis (e.g., Pt complaining of nausea and is later diagnosed with MI; chief complaint is nausea and is documented as such even though the medical diagnosis may be evolving MI).
- **Past Health History:** Record childhood illnesses, surgical procedures, hospitalizations, serious injuries, medical problems, immunization, and recent travel or military service.
- **Medications:** Prescription medications taken regularly as well as those taken only when needed (prn). Note: prn medications may not be used very often and are likely to be expired. Remind Pts to replace expired medications. Inquire about OTC drugs, vitamins, herbs, alternative regimens, and use of recreational drugs or alcohol.
- **Allergies:** Include allergies to drugs, food, insects, animals, seasonal changes, chemicals, latex, adhesives, etc. Try to differentiate between allergy and sensitivity, but always err on the side of safety if unsure. Determine type of allergic reaction (itching, hives, dyspnea, etc.).
- **Family History:** Health status of family (parents, siblings, children, aunts, uncles, and grandparents) as well as spouse/significant other. Obtain age and cause of death of deceased family members.
- **Social History:** Assess health practices and beliefs, typical day, nutritional patterns, activity/exercise patterns, recreation, pets, hobbies, sleep/rest patterns, personal habits, occupational health patterns, socioeconomic status, roles/relationship, sexuality patterns, social support, and stress coping mechanisms.
- **Physical Assessment (objective):** Three types of physical assessment.
 - **Head-to-toe:** More complete, it assesses each region of the body (i.e., head and neck) before moving on to the next.
 - **Systems assessment:** More focused, it assesses each body system (i.e., cardiovascular) before moving on to the next.
 - **Focused assessment:** Priority of assessment is dictated by Pt's chief complaint.

Physical Assessment

Systematic Approach

- Always observe standard precautions.
- Listen to your Pt.
- Provide a comfortable environment and ensure privacy.
- If there is an obvious problem, start at that point.
- Work from head to toe and compare right to left.
- Let your Pt know your findings and use this time to teach.
- Leave sensitive or painful areas until end of examination.
- Techniques used for physical assessment include (1) inspection, (2) palpation, (3) percussion, and (4) auscultation and, except for the abdomen, are carried out in this order.
- Document assessments, interventions, and outcomes.

Assessing Vital Signs

- **Heart Rate:** Palpate pulse point for 30 seconds and multiply by 2; count irregular pulse for full minute. Compare right to left. **Document:** Rate, rhythm, strength, and any right-left differences.
- **Respirations:** Ensure Pt is resting comfortably and unaware respirations are being monitored. Count respirations for 30 seconds and multiply by 2; count irregular or labored respirations for full minute. **Document:** Rate, depth, effort, rhythm, and any sounds, noting whether heard on inspiration, expiration, or both.
- **Blood Pressure:** Place Pt in comfortable position with arm slightly flexed and palm facing up, with forearm supported at heart level (Pt's legs should not be crossed). Apply cuff snugly around upper arm and ensure proper size and fit. Place stethoscope over brachial artery and inflate cuff ~30 mm Hg over expected systolic pressure. Slowly release cuff pressure. **NEVER** use arm with dialysis shunt, injury, intra-arterial line, or same side mastectomy or axillary surgery! Avoid arms with IV/VAD. **Document:** Point at which sound first heard (systolic) over point at which sound completely ceases (diastolic).
- **Temperature:** *Temporal artery:* reading obtained in <1 second; *tympanic:* reading obtained in ~2 seconds; *oral—electronic:* reading

obtained in ~1 minute; *oral—chemical (Temp-a-dot)*: reading obtained in ~45 seconds; *oral—glass*: reading obtained in ~2–3 minutes.

Document: Temperature reading and route.

Adult Vital Signs: Normal Ranges

HR	RR	SBP	DBP	Temp
60–100	12–20	<120 mm Hg	<80 mm Hg	See below
Temporal artery			37.0°–38°C (98.6°–100.4°F)	
Tympanic temperature			37.0°–38.1°C (98.6°–100.6°F)	
Oral temperature			36.4°–37.6°C (97.6°–99.6°F)	
Rectal temperature			37.0°–38°C (98.6°–100.4°F)	
Axillary temperature			35.9°–37.0°C (96.6°–98.6°F)	

Factors Affecting Vital Signs

Factor	HR	RR	SBP	Temp
Fever	↑	↑	Normal	↑
Anxiety	↑	↑	↑	Normal
Pain, acute	↑	↑	↑	Normal
Pain, chronic	↓	Normal	Normal	Normal
Acute MI	↓	↑	↓ (Late)	Normal
Spinal injury	↓	↓	↓	Normal/↑
Tamponade	↑	↑	↓	Normal
CHF	↑	↑	↑ (Early)	↑
Pulm. embolism	↑	↑	↓	↑
Exercise	↑	↑	↑	↑
↓ H&H	↑	↑	↓	↓
↓ Blood glucose	Normal/↑	Normal	Normal/↑	↓

Factor	HR	RR	SBP	Temp
↑ Blood glucose	↑	↑/Deep	↓	↑
↑ WBC	↑	↑	↓ (Sepsis)	↑
↑ K ⁺	↓	Shallow	Normal/↑	Normal
↓ K ⁺	↑	Shallow	↓	Normal
↑ Ca ⁺	↓	Normal	↓	Normal
↓ Ca ⁺	↓	Varies	↓	Normal
↑ Na ⁺	↑	Normal/↑	↑	↑
↓ Na ⁺	↑	Normal/↑	↓	Normal
Narcotics	↓	↓	↓	↓
Beta blockers	↓	↓	↓	Normal
Ca Channel blockers	↓	↓	↓	Normal

Focused Symptom Analysis (OPQRST)

Onset Origin	<ul style="list-style-type: none"> • When did symptom begin? • Was onset sudden or gradual (e.g., over seconds, minutes, days, weeks, etc.)? • Did symptom originate from a sports injury, recent meal, or an unknown origin?
Provocation Precipitation Palliation	<ul style="list-style-type: none"> • Activity at or before onset of symptom. • Factors that worsen symptom. • Factors that alleviate symptom.
Quality	<ul style="list-style-type: none"> • Characteristics (dull, achy, sharp, pressure, etc.).
Radiation Region Related symptoms	<ul style="list-style-type: none"> • Does symptom travel to another part of body? • Determine location (instruct Pt to point with finger). • Related symptoms (e.g., shortness of breath, nausea, indigestion, fever, etc.)
Severity	<ul style="list-style-type: none"> • If pain, rate on a scale of 1–10 (see Pain scale). • If dyspnea, is it mild, moderate, or severe?
Timing	<ul style="list-style-type: none"> • Determine duration of symptom. • Determine if symptom is constant or intermittent.

S.A.M.P.L.E. History

S	• Signs and symptoms.
A	• Allergies (include food and environmental allergies).
M	• Medications (include OTC and herbal supplements).
P	• Pertinent medical or surgical history.
L	• Last oral intake.
E	• Events leading up to illness or injury.

Head and Neck

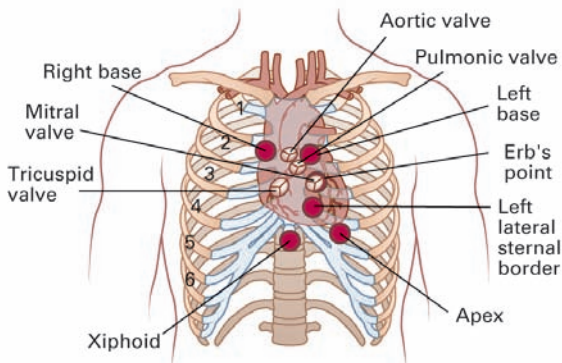
Appearance: Inspect overall appearance.	<ul style="list-style-type: none"> • Hygiene, state of well-being, nutrition status. • Level of consciousness, emotional status, speech, affect, posture, gait, coordination, balance. • Note any gross deformities.
Skin: Inspect and palpate exposed skin.	<ul style="list-style-type: none"> • Warmth, moisture, color, texture, lesions. • Scars, body piercings, tattoos.
Hair and Nails: Inspect hair, hands, and nails.	<ul style="list-style-type: none"> • Hair color, fullness and distribution, noting any signs of malnutrition (e.g., thinning). • Infestation or disease. • Clubbing of nails, deformity of hands.
Head: Inspect and palpate face and scalp.	<ul style="list-style-type: none"> • Facial symmetry. • Scalp tenderness, lesions, or masses.
Eyes: Inspect sclera, pupils, and conjunctiva.	<ul style="list-style-type: none"> • Color and hydration of conjunctiva and sclera. • PERRLA: Pupils equal, round, reactive to light and accommodation.
Ears: Inspect.	<ul style="list-style-type: none"> • Hearing impairment. • Use of hearing aids. • Pain, inflammation, drainage.

Nose: Inspect.	<ul style="list-style-type: none"> • Congestion, drainage, and sense of smell. • Patency/equality of nostrils, nasal flaring. • Septal deviation.
Throat and Mouth: Inspect teeth, gums, tongue, mucous membranes, and oropharynx.	<ul style="list-style-type: none"> • Color and hydration of mucous membranes. • Gingival bleeding or inflammation. • Condition of teeth (e.g., any missing), dentures. • Difficult or painful swallowing. • Presence or absence of tonsils. • Oral hygiene and presence of odor.
Neck: Inspect and palpate neck. Test ROM.	<ul style="list-style-type: none"> • Jugular vein distention (JVD), tracheal alignment (deviation), and retractions. • Swollen lymph nodes, enlarged thyroid. • Decreased ROM, stiffness, pain.

Cardiovascular System

Inspect	<ul style="list-style-type: none"> • Overall condition and appearance. • Skin, nail beds, and extremities for flushing, pallor, cyanosis, bruising, and edema. • Chest for scars, symmetry, movement, deformity. • Neck for JVD and PMI for any remarkable pulsations. • Analyze ECG recording if available.
Palpate	<ul style="list-style-type: none"> • Skin temperature and moisture. • PMI for any lifts, heaves, thrills, or vibrations. • Grade radial, dorsalis pedis, and posterior tibial pulses noting rate and rhythm; palpate and grade edema.
Percuss	<ul style="list-style-type: none"> • Starting at midaxillary line, percuss toward left cardiac border along fifth ICS. • Sound should change from resonance to dullness at midclavicular line.
Auscultate	<ul style="list-style-type: none"> • Compare apical and radial pulse. • Heart valves for normal S_1, S_2 (lub, dub) heart sounds. • Abnormal sounds include extra beats (S_3, S_4), bruits, murmurs, pericarditic rubs, and artificial valve clicks.

Cardiac Auscultation Sites



Circulation and Pulses

Pulses	• Equality and character of pulses, comparing right to left.
6 Ps	• Pain, pallor, pulselessness, polar, paresthesia, paralysis.
S/S	• Swelling, limb pain, changes in sensation, fatigue.
Skin	• Color, temperature, moisture, hair growth.
Edema	• Extremities and dependent areas for edema, varicosities.
Nails	• Capillary refill, cyanosis, angle of attachment, clubbing.
History	• PVD, DM, HTN, CHF, DVT, surgical procedures, lymphedema, medications.

Capillary Refill

Normal	<3 seconds
Delayed	>3 seconds

Pulse Strength

0	Absent	<i>Record findings below</i>	
1	Weak	Right arm:	Left arm:
2	Normal		
3	Full	Right leg:	Left leg:
4	Bounding		

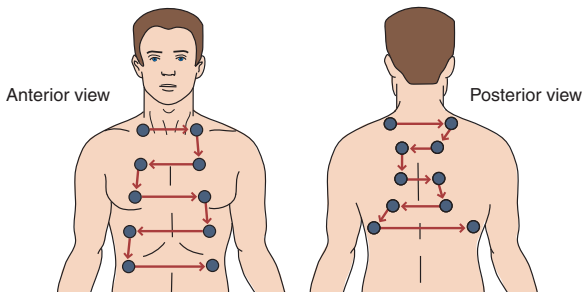
Edema Scale

+1	<ul style="list-style-type: none"> • 2 mm of depression that disappears rapidly. • No visible distortion of extremity.
+2	<ul style="list-style-type: none"> • 4 mm of depression that disappears in ~10–15 seconds. • No visible distortion of extremity.
+3	<ul style="list-style-type: none"> • 6 mm of depression that lasts >1 minute. • Dependent extremity appears swollen.
+4	<ul style="list-style-type: none"> • 8 mm of depression that lasts 2–3 minutes. • Dependent extremity is grossly edematous.

Respiratory System

Inspect	<ul style="list-style-type: none"> • Respirations for rate, depth, effort, pattern, and cough (productive or nonproductive); note signs of distress such as nasal flaring or sternal retractions. • Size and shape of chest, symmetry of chest wall movement, and use of accessory muscles. • Extremities for cyanosis and fingers for clubbing indicating chronic hypoxia. • Trachea for scars, stomas, or deviation from midline.
Palpate	<ul style="list-style-type: none"> • Anterior and posterior thorax for subcutaneous emphysema, crepitus, and tenderness. • Assess tactile fremitus; palpate chest as Pt says “99.”
Percuss	<ul style="list-style-type: none"> • Anterior and posterior thorax for tympany (hollow organs), resonance (air-filled organs), dullness (solid organs), or flatness (muscle or bone).
Auscultate	<ul style="list-style-type: none"> • All anterior and posterior lung fields, noting normal, abnormal, or absence of lung sounds.

Order of Auscultating Lung Sounds



Respiratory Patterns

Normal (eupnea)	Regular and comfortable at 12–20 breaths/minute.
Tachypnea	20 breaths/minute.
Bradypnea	<12 breaths/minute.
Hyperventilation	Rapid, deep respiration >20 breaths/minute.
Apneustic	Neurological—sustained inspiratory effort.
Cheyenne-Stokes	Neurological—alternating patterns of depth separated by brief periods of apnea.
Kussmaul's	Rapid, deep, and labored—common in DKA.
Air trapping	Difficulty during expiration— emphysema.

Lung Sounds—Differential Diagnosis

Rales/crackles	Simulated by rolling hair near ear between two fingers, best heard on inspiration in lower bases, unrelieved by coughing, (e.g., CHF, pneumonia).
Wheezes	High-pitched, squeaking sound, best heard on expiration over all lung fields, unrelieved by coughing (e.g., asthma, COPD, emphysema).

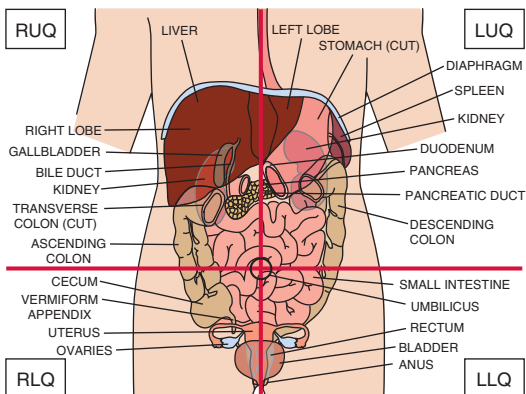
Rhonchi	Coarse, harsh, loud gurgling or rattling, best heard on expiration over bronchi and trachea, often relieved by coughing (e.g., bronchitis, pneumonia).
Stridor	Life-threatening! Harsh, high-pitched, easily audible on inspiration, progressive narrowing of upper airway requiring immediate attention (e.g., partial airway obstruction, croup, epiglottitis).
Unilaterally absent or diminished	Inability to hear equal, bilateral breath sounds (e.g., pneumothorax, tension pneumothorax, hemothorax, or history of pneumectomy).
Documentation of lung sounds	Rate, rhythm, depth, effort, sounds (indicate if sound is inspiratory and/or expiratory phase), and fields of auscultation, interventions (if any) and outcomes.

NCLEX

Gastrointestinal System—Abdomen

Inspect	<ul style="list-style-type: none"> • Skin, distention, scars, obesity, herniations, bruising, pulsations.
Auscultate (before palpate)	Bowel tones <ul style="list-style-type: none"> • Hypoactive; every minute. • Normal; every 15–20 seconds. • Hyperactive; as often as every 3 seconds.
Percussion	<ul style="list-style-type: none"> • Dullness—solid organ such as the liver. • Tympany—hollow organs such as bowels. • Resonance—air-filled organs such as lungs. • Flatness—dense tissue such as muscle and bone.
Palpate (last)	<ul style="list-style-type: none"> • Pulsations, masses, tenderness, rigidity.

Abdominal Organs



Musculoskeletal – Extremities

Grips	<ul style="list-style-type: none"> Equality and strength—have Pt squeeze your fingers. Assess push-pull strength of feet.
CSM	<ul style="list-style-type: none"> Pulses, capillary refill, sensation, and motor function.
Nails	<ul style="list-style-type: none"> Cyanosis, angle of attachment, clubbing.
ROM	<ul style="list-style-type: none"> Limitations and pain during movement.
Edema	<ul style="list-style-type: none"> Localized versus diffuse; dependent versus non-dependent.
DVT NCLEX	<ul style="list-style-type: none"> Homans' sign—calf pain on dorsiflexion of foot. NEVER massage affected extremities! S/S—pain, venous distention, and localized tenderness.

Muscle Strength Grading Scale

0	• No muscle movement.
1	• Visible muscle movement, but no joint movement.
2	• Joint movement, but not against gravity.
3	• Movement against gravity, but not against resistance.
4	• Movement against resistance, but less than normal.
5	• Normal strength.

Integumentary: Skin

Color	• Cyanosis, redness, pallor, or jaundice.
Temp	• Coolness or warmth.
Moisture	• Diaphoresis or excessive dryness.
Turgor	• Time it takes skin to flatten out after pinching. • Poor skin turgor may indicate dehydration; may be normal in elderly.
Edema	• Extremities, sacrum or dependent side if debilitated. • Facial or sclera edema. • Bilateral versus unilateral.
Lesions	• Presence and type of skin lesions.

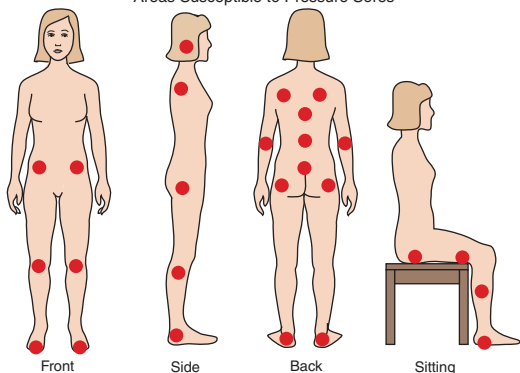
Wound Assessment

- **Appearance:** Color (pink, healing; yellow, infection; black, necrosis), sloughing, eschar, longitudinal streaking, etc.
- **Size:** Measure length, width, and depth in cm.
- **Incisions:** Approximated edges, dehiscence, or evisceration.
- **Undermining:** Use a sterile, cotton-tipped applicator to probe gently underneath edges until resistance is met. With a felt-tipped pen, mark where applicator can be felt under skin.
- **Induration:** Abnormal firmness of tissues with margins. Assess by gently pinching tissue distal to wound edge; if indurated you will be unable to pinch fold of skin.
- **Tissue edema:** Note if edema is pitting or nonpitting. **Note: If wound is crepitant, notify physician immediately (may indicate gangrene).**

- **Granulation:** Bright red, shiny, and granular. Indicates that wound is healing. Note: poorly vascularized tissue appears pale pink, dull, or dusky red.
- **Drainage:** Type (sanguineous, serosanguineous, purulent), amount, color, and consistency.
- **Odor:** Foul odor indicates infection.
- **Staging:** See Staging Pressure Ulcers section on page 38.

Areas Susceptible to Pressure Ulcers

Areas Susceptible to Pressure Sores



Risk Factors for Developing Pressure Ulcers

- **Alterations in sensation or response to discomfort:** Degenerative neurological/neuromuscular disease, cerebrovascular disease, brain or spinal cord injury, depression, drugs that adversely affect alertness.
- **Alterations in mobility:** Neurological disease/injury, fractures, contractures, pain, or restraints.

- **Significant changes in weight:** Protein-energy malnutrition (PEM), severe edema, obesity.
- **Medical conditions:** Malnutrition and dehydration, diabetes mellitus, peripheral vascular disease, end-stage renal disease, congestive heart failure, malignant diseases, chronic obstructive pulmonary disease, obesity, or bowel and bladder incontinence.

Pressure Ulcer Prevention Strategies

- Inspect skin at beginning of each shift and document findings. More frequent (every 2 hours) assessments are required for debilitated Pts.
- Effectively manage urine and fecal incontinence.
- Clean skin promptly, using mild, nonirritating, nondrying cleaning solution, and avoid friction during cleaning.
- Use topical moisture barriers and moisture-absorbing pads if incontinent.
- Position Pts to alleviate pressure and shearing forces.
- Reposition Pts every 2 hours while in bed and every hour while in chair.
- Teach Pt to shift weight every 15 minutes while in chair.
- Use appropriate positioning devices and foam padding.
- Do not use donut-shaped devices.
- Avoid positioning Pts directly on trochanters or directly on wound.
- Maintain lowest head elevation position possible to minimize sacral pressure.
- Utilize extra staff and appropriate lifting devices.
- Prevent contractures.
- Provide adequate hydration and nutrition.
- Do not massage reddened areas over bony prominences.

Staging Pressure Ulcers

Stage I	<ul style="list-style-type: none"> • Intact, nonblanching erythematous area. • Indicates potential for ulceration.
Stage II	<ul style="list-style-type: none"> • Interruption of epidermis, dermis, or both. • Presents as abrasion, blister, or very shallow crater.
Stage III	<ul style="list-style-type: none"> • Full-thickness crater involving damage and/or necrosis down to, but not penetrating, fascia.
Stage IV	<ul style="list-style-type: none"> • Full thickness, similar to stage III, but penetrating fascia with involvement of muscle and bone. • May involve undermining.
Note: Ulcers that are covered with eschar and cannot be staged without débridement are sometimes called stage V.	

Pressure Ulcer Management

Stage I	<ul style="list-style-type: none"> • No dressing required. • Prevent continued pressure or shearing forces. • Assess frequently.
Stage II	<ul style="list-style-type: none"> • Use dressing that will keep ulcer bed moist. • Keep surrounding intact skin dry. • Fill wound dead space with loosely packed dressing material to absorb excess drainage and maintain moist environment.
Stage III	<ul style="list-style-type: none"> • Same as stage II plus débride eschar, necrotic tissue. • Note: Heel ulcers with dry eschar and no edema, erythema, or drainage may not need to be débrided. • Débridement may be done surgically, with enzymatic agents, or mechanically with wet-to-dry dressings, water jets, or whirlpool. • Do not use topical antiseptics.
Stage IV	<ul style="list-style-type: none"> • Same as stages II and III plus remove all dead tissue, explore undermined areas and remove skin "roof." • Use clean, dry dressings for 8–24 hours after sharp débridement to control bleeding, and then resume moist dressings.

Common Dressings for Pressure Ulcers

Transparent (stage I, II)	<ul style="list-style-type: none"> • Waterproof; maintains moisture and prevents bacterial contamination. • For superficial wounds, blisters, and skin tears.
Hydrogel (stage II, III, IV)	<ul style="list-style-type: none"> • Provides moist wound environment. Reduces pain and soothes. • For dry, sloughy wound beds; cleanses and débrides.
Hydrocolloid (stage II, III)	<ul style="list-style-type: none"> • For autolytic débridement of dry, sloughy, or necrotic wounds. • For wounds with low-to-moderate exudate.
Alginate (stage III, IV)	<ul style="list-style-type: none"> • Available in pads, ropes, or ribbons. • For wounds with moderate to heavy exudate.
Foam (stage III, IV)	<ul style="list-style-type: none"> • Highly absorbent; may be left on for 3–4 days. • For wounds with heavy exudate, deep cavities, weeping ulcers. • Used after débridement or desloughing of ulcers.

Compression Bandages for Venous Ulcers

Single-layer	Simple tubular woven bandages imprinted with rectangles that stretch to squares when appropriate wrapping tension (30–40 mm Hg) is applied (e.g., ACE bandage, Comperm, Setopress).
Three-layer	Layers include padding absorption layer, compression bandage layer, and cohesive compression bandage. Bandages may be left in place for ≤ 1 week depending on wound exudate volume (e.g., Dyna-Flex).
Four-layer	Layers include nonwoven wound contact layer permeable to wound exudate and four overlying bandages. Bandages may be left in place for ≤ 1 week depending on exudate volume (e.g., Profore).
Impregnated wrap	Porous flexible occlusive dressing comprising stretchable gauze and nonhardening zinc oxide paste (e.g., Unna boot).

Genitourinary—Reproductive Assessment

Pain	<p>Female: Assess for dysmenorrhea (abnormally severe cramping or pain in lower abdomen during menstruation).</p> <p>Male: Assess for pain in penis, testes, scrotum, and groin area. History of painful or burning urination?</p>
Lesions	Perineal blisters, ulcers, sores, warts, or rashes.
Breast	Inspect for asymmetry. Inspect skin for dimpling or edema. Inspect nipples for color, discharge, or inversion. Palpate in concentric circle, outward from nipple, including axillae, for lumps or tenderness and presence of implants. Does Pt perform breast self-examinations?
Testicles	Palpate scrotum and groin area for lumps, masses, or swelling. Does Pt perform testicular self-examinations?
Discharge	<p>Female: Assess for vaginal discharge and note color, odor, amount, and any associated symptoms.</p> <p>Male: Inspect meatus for discharge and note color, amount, and any associated symptoms.</p>
Menstruation	Describe last menstrual period including date. Do periods occur regularly? Have Pt describe her normal flow. Investigate bleeding other than normal menstrual period including frequency, quantity, and associated symptoms.
Symptoms	Kidney stones, blood in urine, dysuria, change in voiding pattern (frequency), itching; Males: Erectile dysfunction.
Sexual history	Is Pt sexually active? Does Pt use protection against infection? Method of birth control? Multiple or same-sex partners? Concern with or history of STD?

Neurological Assessment

Mental status	<ul style="list-style-type: none"> • Affect, mood, appearance, behavior, and grooming. • Clarity of speech and coherence. • Alert, lethargic, confused, obtunded, or stuporous. • Orientation to person, place, time, and/or situation.
Motor	<ul style="list-style-type: none"> • Involuntary movements, muscle symmetry, atrophy. • Muscle tone: Flex and extend wrists, elbows, ankles, and knees; slight, continuous resistance to passive movement is normal. Note any decreased (flaccid) or increased (rigid or spastic) muscle tone. • Motor strength: Have Pt move against resistance (see Muscle Strength Grading Scale on page 35).
Reflexes	<ul style="list-style-type: none"> • Tendon reflexes: (see Tendon Reflex Grading Scale). • Babinski (plantar reflex): Stroke lateral aspect of sole of each foot with reflex hammer. Normal response is flexion (withdrawal) of toes. Positive (abnormal) Babinski is characterized by extension of big toe with fanning of other toes. • Clonus: With knee supported in partially flexed position, quickly dorsiflex foot. Rhythmic oscillations—positive clonus.
Gate/balance	<ul style="list-style-type: none"> • Observe gait while Pt walks across room and back. • Have Pt walk heel-to-toe or on heels in a straight line. • Have Pt hop in place on each foot. • Have Pt do shallow knee bend.
Coordination	<ul style="list-style-type: none"> • Rapid alternating movements: Instruct Pt to tap tip of thumb with tip of index finger as fast as possible. • Point-to-point movements: Instruct Pt to touch nose and your index finger alternately several times. Continually change position of your finger during test. • Romberg test: Be prepared to catch Pt! Request that Pt stand with feet together, eyes closed for 10 seconds. If Pt becomes unstable, test is positive, indicating proprioceptive or vestibular problem. • Proprioception: While standing, instruct Pt to close eyes and alternate touching index fingers to nose.
Sensory	<ul style="list-style-type: none"> • Using your finger and a toothpick, instruct Pt to distinguish between sharp and dull sensations. Compare left to right (Pt's eyes closed).

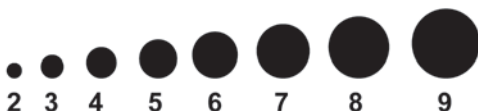
Deep Tendon Reflex Grading Scale

0	• Absent
1+	• Diminished
2+	• Normal
3+	• Hyperactive without clonus
4+	• Hyperactive with clonus

Oculocephalic Reflex (Doll's Eye Response)

Purpose	<ul style="list-style-type: none"> • Evaluation of brainstem reflex in unconscious or comatose Pts. • Never perform if neck injury suspected.
Normal	• Eyes move in opposite direction from head rotation.
Abnormal	<ul style="list-style-type: none"> • Eyes move in same direction as head rotation. • Abnormal (negative) doll's eye response may indicate severe brain damage or brain death.

Pupil Scale (mm)



Glasgow Coma Scale (GCS)

Eyes open	Spontaneously	4	Findings
	To command (infant: to noise/voice)	3	
	To pain	2	
	Unresponsive	1	
Best verbal response	Oriented (infant: coos/babbles)	5	Findings
	Confused (infant: irritable)	4	
	Inappropriate (infant: cries to pain)	3	
	Incomprehensible (infant: grunts/moans)	2	
	Unresponsive	1	
Best motor response	Obeys commands (infant: spontaneous)	6	Findings
	Localizes pain	5	
	Withdraws from pain	4	
	Abnormal flexion	3	
	Abnormal extension	2	
	Unresponsive	1	
Total			

Note: A GCS score should be broken down into its relative components (e.g., a GCS of 11 could be stated as E3V3M5). A GCS of 13–14 indicates mild brain injury; 9–12, moderate brain injury; 3–8, severe brain injury.

Source: From Teasdale G, Jennet B. Assessment of coma and impaired consciousness: a practical scale. *Lancet*. 1974;2:81–84.

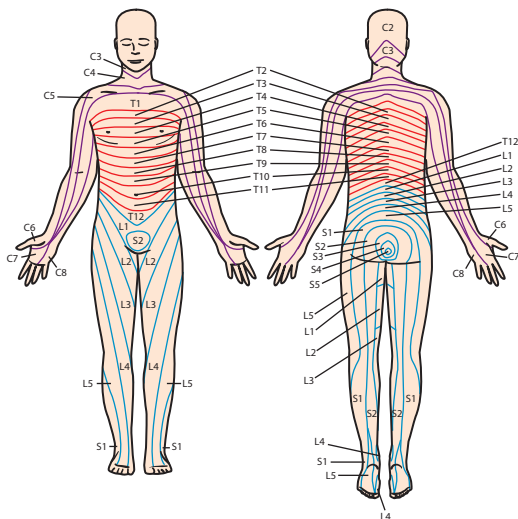
AVPU Scale

Alert	Pt is alert and requires no stimulation.
Verbal	Pt responds only to verbal stimulation.
Painful	Pt responds only to painful stimulation.
Unresponsive	Pt is unresponsive to any stimulation.

Dermatomes

Each dermatome represents an area supplied with afferent or sensory nerve fibers supplied by individual nerve root from spinal cord; cervical, **C1–8**; thoracic, **T1–12**; lumbar, **L1–5**; sacral, **S1–5**. Dermatomes are used to assess sensation when locating source of lesion or spinal cord injury.

Assessment	<ul style="list-style-type: none"> • Test sensation to pinprick in all dermatomes. • If Pt is found to have no sensation below level of nipples, then lesion or injury is likely at level of T4.
Document	<ul style="list-style-type: none"> • Record most caudal (lowest) dermatome that feels pinprick (e.g., "No sensation at or below level T4").



Cranial Nerve Assessment

Nerve		Name	Function	Test
I	S	Olfactory	Smell	Have Pt identify familiar odors (e.g., coffee).
II	S	Optic	Visual acuity	Assess visual acuity (eye chart).
			Visual field	Assess peripheral vision.
III	M	Oculomotor	Pupillary reaction	Assess pupils for equality and reactivity to light.
IV	M	Trochlear	Eye movement	Have Pt follow your finger without moving head.
V	B	Trigeminal	Facial sensation	Touch face and assess for sharp and dull sensation.
			Mastication	Have Pt hold mouth open.
VI	M	Abducens	Abduction of eye	Have Pt follow your finger without moving head.
VII	B	Facial	Facial expression	Have Pt smile, wrinkle face, puff cheeks.
			Sense of taste	Ask Pt to differentiate between sweet and salty taste.
VIII	S	Acoustic	Hearing	Snap fingers close to Pt's ears.
			Balance	Feet together, arms at side with eyes closed for 5 seconds.

Continued

Nerve		Name	Function	Test
IX	B	Glosso-pharyngeal	Swallowing and voice	Have Pt swallow and then say "AH."
X	B	Vagus	Gag reflex	Use tongue depressor or swab to elicit gag reflex.
XI	M	Spinal accessory	Neck motion	Have Pt shrug shoulders or turn head against resistance.
XII	M	Hypoglossal	Tongue movement	Have Pt stick out tongue and move it from side to side.
S = Sensory only; M = Motor only; B = Both sensory and motor				

Psychiatric—Mental Health Assessment

General Safety Guidelines

- **Safety: Your safety ALWAYS comes first!**
- **Awareness:** Watch for nonverbal indicators of aggression or violence; clenched fists, pacing, raised tone of voice, increased respirations, profanity, verbal threats, weapons, wide-eyed stare.
- **Exit:** Always position yourself between Pt and an exit. Never allow Pt to block your means of escape.
- **Be assertive:** Make your boundaries known, set limits, and stick to them. Avoid arguing or bargaining with Pts.

Mental Status Assessment

- **Appearance:** Grooming, hygiene, posture, and eye contact. Correlation between appearance, developmental stage and age.
- **General attitude:** Cooperative, uncooperative, friendly, hostile, defensive, guarded, apathetic.
- **Mood:** Depressed, sad, anxious, fearful, labile, irritable, elated, euphoric, guilty, despairing.
- **Motor activity:** Tremors, tics, mannerisms, gestures, gait, hyperactivity, restlessness, agitation, echopraxia, rigidity, aggressiveness.

- **Sensory/perceptual disturbances:** Hallucinations (auditory, visual, tactile, olfactory, gustatory). Illusions (depersonalization, derealization).
- **Affect:** Congruent with mood, flat, inappropriate.
- **Cognitive:** Alertness, orientation, memory, abstract thinking.
- **Speech pattern:** Aphasia, volume, impairments, stuttering.
- **Thought process:**
 - **Form of thought:** Tangentiality, word salads, neologisms, echolalia, attention span.
 - **Content of thought:** Delusional, suicidal, homicidal, obsession, paranoid, suspicious, religiosity-based, phobic, magical.
- **Impulse control:** Aggression, fear, guilt, affection, sexual.
- **Judgment/insight:** Decision making, problem-solving, coping.

Suicide—Assessment and Intervention

General Guidelines

- If, at any time, Pt is threatening suicide, get help, call 911.
- Provide safe environment.
- Always take overt or covert suicide threats or attempts seriously.
- Observe Pt closely.
- Encourage expression of feelings.
- Assign tasks to increase feelings of usefulness.
- Provide full schedule of activities.
- Show acceptance, respect, and appreciation.
- Do not argue with Pt.
- Remind Pt that there are alternatives to suicide.

Groups at Increased Risk for Suicide

- Adolescent and young adult Pts (ages 15–24).
- Elderly Pts.
- Terminally ill Pts.
- Pts who have experienced stress or loss.
- Survivors of persons who have committed suicide.
- Individuals with bipolar disorder or schizophrenia.
- Pts coming out of depression.
- People who abuse alcohol or other drugs.
- Pts who have previously attempted suicide.
- More women attempt suicide; more men complete suicide.

Lethality Assessment

- **Intention:** Ask Pt if he or she thinks about and/or intends to harm self.
- **Plan:** Ask Pt if he or she has formulated a plan. What are the details; where, when, and how will plan be carried out?
- **Means:** Check availability of method; access to gun, knife, pills, etc.
- **Lethality of means:** Pills versus gun; jumping versus slitting wrist.
- **Rescue:** Possibility of rescue.
- Support or lack of support.
- Anxiety or hostility level.
- Disorganized thinking.
- Preoccupation with thought of suicide plan.
- Prior suicide attempts.

Alcohol and Drug Abuse Assessment

Text rights not available.

RAFFT Questionnaire

	Yes	No
Relaxation: Do you ever use drugs or drink alcohol in order to relax or improve your self-esteem?	1	0
Alone: Do you ever use drugs or drink alcohol while you are alone?	1	0
Friends: Do you have any friends who use drugs or have a problem with alcohol?	1	0
Family: Does any of your close family use drugs or have a problem with alcohol?	1	0
Trouble: Have you ever gotten into trouble because of alcohol or drugs?	1	0
Note: Any positive answer warrants further investigation	Total	

Source: From Riggs S, Alario A. Adolescent substance use. In Dubé CE, Goldstein MG, Lewis DC, Myers ER, Zwick WR, eds. *Project ADEPT Curriculum for Primary Care Physician Training: Volume II Special Topics*. Providence, RI: Brown University; 1989.

Pain Assessment

Text rights not available.

OPQRST

Onset	When did pain begin; sudden or gradual onset?
Provokes Palliation Precipitation	What provokes pain (exertion, spontaneous onset, stress, postprandial, etc.)? What makes it better (position, being still)? What makes it worse (inspiration, palpation)?
Quality	Characteristics; dull, achy, sharp, stabbing, pressure, deep, surface? Similar to previous episodes of pain?
Radiation Related s/s	Does it radiate (jaw, back, arms, etc.)? Any related symptoms (dyspnea, nausea, indigestion, fever, etc.)?
Severity	Explain pain scale (0 being no pain and 10 being worst pain imaginable) and have Pt rate pain (see pain scale, page 49).
Time	Constant or intermittent? Duration? Frequency?

Nursing Interventions for Pain Management

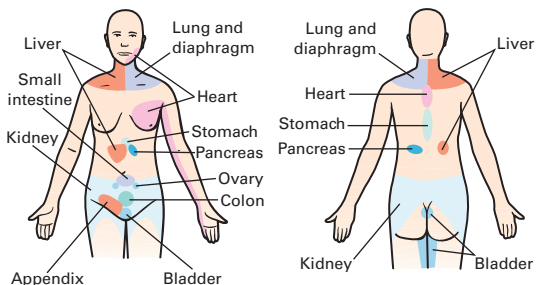
Intervention	Example
Provide comfort.	Positioning, rest, and relaxation.
Validate Pt's response to pain.	Offer reassurance.
Relieve anxiety and fears.	Set aside time with Pt.
Relaxation techniques.	Rhythmic breathing, guided imagery.
Cutaneous stimulation.	Massage, heat and cold therapy.
Decrease irritating stimulus.	Bright lights, noise, temp.

Characteristics of Acute and Chronic Pain

	Acute Pain	Chronic Pain
Onset	Current.	Continuous or intermittent.
Duration	<6 months.	>6 months.
ANS response	↑ HR, RR, BP, diaphoresis, pupillary dilation, muscle tension.	Rarely present.
Relevance to healing	Diminishes as healing occurs.	Continues long after healing.
Analgesics	Responsive.	Rarely responsive.

Referred Pain

Phenomenon of pain perceived at a site adjacent to or at a distance from the site of the pain's origin (e.g., cardiac pain often manifests in the arm).



Nutritional Assessment

	Normal Findings	Suggests Malnutrition
Demeanor	Alert and responsive with positive outlook.	Lethargic, negative attitude.
Weight	Reasonable for build.	Underweight, overweight.
Hair	Glossy, full, firmly rooted, and uniform in color.	Dull, sparse, easily and painlessly plucked.
Eyes	Bright, clear, and shiny.	Pale conjunctiva, redness, dryness.
Lips	Smooth.	Chapped, red, and swollen.
Tongue	Deep red and slightly rough with one longitudinal furrow.	Bright red or purple, swollen or shrunken, with several longitudinal furrows.

Continued

	Normal Findings	Suggests Malnutrition
Teeth	Bright and painless.	Cavities, painful, mottled, or missing.
Gums	Pink and firm.	Spongy, bleeding, receding.
Skin	Clear, smooth, firm, and not excessively dry.	Rashes, swelling, spots, excessive dryness, poorly healing wounds.
Nails	Pink and firm.	Spoon-shaped, ridged, spongy bases.
Mobility	Erect posture, good muscle tone, walks without difficulty.	Muscle wasting, skeletal deformities, loss of balance.

Physical Findings of Dehydration

	Mild	Moderate	Severe
Mentation	Alert	Lethargic	Obtunded
Capillary refill	2 sec	2–4 sec	>4 sec
Mucous membranes	Normal	Dry	Parched, cracks
Heart rate	Slightly ↑	Increased	Very increased
Pulse (character)	Normal, full	Thready	Faint, impalpable
Respiratory rate	Normal	Increased	Fast; hyperpnea
Blood pressure	Normal	Orthostatic	Decreased
Skin turgor	Normal	Slow	Tenting
Urine output	Decreased	Oliguria	Oliguria, anuria

NCLEX

Fluid and Electrolytes

Normal Intake and Output

- **Intake:** 1500–2500 mL over a 24-hour period.
- Remember! **A kilogram gained is a liter retained!**
- **Output:** 1500–2500 mL over a 24-hour period (40–80 mL/hour), which includes insensible losses.
- Minimum urine output is 30 mL/hour.
- Insensible loss (respiration, sweating, BM) is 500–1000 mL/day.

Fluid Volume Overload	<ul style="list-style-type: none"> • General: Weight gain and edema. • Integumentary: Skin stretched and shiny. • CV: Decreased hematocrit, widened pulse pressure, emptying of hand veins >5 sec, pulmonary edema, congestive heart failure. • Urinary: Polyuria, dilute urine (decreased output in renal failure). • GI: Nausea and anorexia (edema of bowel). • CNS: Deteriorating confusion.
Fluid Volume Deficit	<ul style="list-style-type: none"> • General: Weight loss. • Integumentary: Poor skin turgor, dry mucous membranes. • CV: Increased hematocrit, narrowing pulse pressure, filling of hand veins >5 sec, postural hypotension, tachycardia on standing. • Urinary: Oliguria, concentrated urine. • GI: Thirst, anorexia (decreased blood flow to intestine), longitudinal furrows on tongue. • CNS: Confusion and disorientation.



Electrolyte Imbalances

Imbalance	Signs and Symptoms	Common Causes
Hypercalcemia Serum calcium level >10.5 mg/dL	Weakness, fatigue, anorexia, nausea, vomiting, constipation, polyuria, tingling lips, muscle cramps, confusion, hypoactive bowel tones.	Hyperparathyroidism or malignancies, thiazide diuretics, lithium, renal failure, immobilization, metabolic acidosis.
Hypocalcemia Serum calcium level <8.5 mg/dL	Anxiety, irritability, twitching around mouth, convulsions, tingling/numbness of fingers, diarrhea, abdominal/muscle cramps, arrhythmias.	Inadequate vitamin D intake, low albumin, renal failure, lactose intolerance, Crohn's disease, hyperthyroid, ↑ magnesium, acute pancreatitis.

Continued

Imbalance	Signs and Symptoms	Common Causes
Hyperkalemia Serum potassium level >5.0 mEq/L	Weakness, nausea, diarrhea, hyperactive GI, muscle weakness and paralysis, arrhythmias, dizziness, postural hypotension, oliguria.	Potassium-sparing diuretics, NSAIDs, renal failure, multiple transfusions, \downarrow renal steroids, OD of potassium supplements.
Hypokalemia Serum potassium level <3.5 mEq/L	Anorexia, nausea, vomiting, fatigue, \downarrow LOC, leg cramps, muscle weakness, anxiety, irritability, arrhythmias, postural hypotension, coma.	Anorexia, fad diets, prolonged NPO status, alkalosis, transfusion of frozen RBCs, prolonged NGT suctioning.
Hypermagnesemia Serum magnesium level >2.7 mg/dL	Muscle weakness and fatigue are most common, nausea, vomiting, flushed skin, diaphoresis, thirst, arrhythmias, palpitations, dizziness.	\uparrow Magnesium intake, chronic renal disease, pregnant women on parenteral magnesium for pre-eclampsia, Addison's disease.
Hypomagnesemia Serum magnesium level <1.7 mg/dL	Diarrhea, anorexia, arrhythmias, lethargy, muscle weakness, tremors, nausea, dizziness, seizures, irritability, confusion, psychosis, \downarrow BP, \uparrow HR.	Prolonged NGT suctioning, diarrhea, laxative abuse, malnutrition, alcoholism, prolonged diuretic use, DKA, digoxin.
Hypernatremia Serum sodium level >145 mEq/L	Confusion, fever, tachycardia, low BP, postural hypotension, dehydration, poor skin turgor, dry mucous membranes, flushed.	Fever, vomiting, diarrhea, ventilated Pts, severe burns, profuse sweating, diabetes insipidus, diuresis.
Hyponatremia Serum sodium level <135 mEq/L	Nausea, vomiting, abdominal cramps, diarrhea, headache, dizziness, confusion, flat affect, \downarrow DBP, \uparrow HR, postural hypotension, \downarrow deep tendon reflex.	Diuretic use, vomiting, diarrhea, burns, hemorrhage, fever, diaphoresis, CHF, renal failure, hyperglycemia, \uparrow ADH.

Reusable Assessment Form (Make Photocopies
for Multiple Pts)

Pt Initials	Vital Signs Q:	Height:	Weight:
Room	1st Assess ____: ____	Treatments/Current Status	
Age Sex	T (°)	Diet NPO Clear Full ADA AHA	
Allergies	HR	CBG	
	RR	Activity	
	BP	Dressing	
	SpO ₂ on	Foley	
	Lungs	IV/Fluids	
Diagnosis	Pain	Teaching	
	Intake	Labs/Diagnostics/p.r.n.	
Surgery	Output		

Reusable Assessment Form (Make Photocopies for Multiple Pts)

2nd Assess _____:	Med/Treatment ↓	Times →	Scheduled Medications/Treatments							
T (°)										
HR										
RR										
BP										
SpO ₂ on										
Lungs										
Pain										
Tx/Result										
Intake										
Output										

Assessment Notes (Make Copies for Multiple Pts)

Neuro

Respiratory

CV

GI

GU

MS

Pain

Skin

Exception-Based Charting is used to document exceptions or deviations from the norm as compared with previous assessments. Only exceptions or deviations need to be documented. In most cases, a check mark (✓) indicates within normal limits, an arrow (→) indicates no change from previous assessment, and an asterisk (*) indicates any deviation in status since previous assessment. Any (*) needs to be clearly documented.

General Report (Make Copies for Multiple Pts)

Name	Age	Sex	Rm#
Diagnosis		Code Status	
Admit Date	Dr.		
Procedure			
Neurological			
Respiratory			
CV			
GI-GU			
MS			
Pain			
Skin			
Incision-Dressing			
I & O			
IVs	LTC		
Diet-NPO			
Activity			
Labs-Procedures			
Miscellaneous			
D/C Planning-Teaching Needs			

Reusable Assessment Form (Make Photocopies for Multiple Pts)

Pt Initials	Vital Signs Q:	Height:	Weight:
Room	1st Assess ____: ____	Treatments/Current Status	
Age Sex	T (°)	Diet NPO Clear Full ADA AHA	
Allergies	HR	CBG	
	RR	Activity	
	BP	Dressing	
	SpO ₂ on	Foley	
	Lungs	IV/Fluids	
Diagnosis	Pain	Teaching	
	Intake	Labs/Diagnostics/p.r.n.	
Surgery	Output		

Reusable Assessment Form (Make Photocopies for Multiple Pts)

2nd Assess ____: ____	Med/Treatment ↓	Times →	Scheduled Medications/Treatments							
T (°)										
HR										
RR										
BP										
SpO ₂ on										
Lungs										
Pain										
Tx/Result										
Intake										
Output										

Assessment Notes (Make Copies for Multiple Pts)

Neuro

Respiratory

CV

GI

GU

MS

Pain

Skin

Exception-Based Charting is used to document exceptions or deviations from the norm as compared with previous assessments. Only exceptions or deviations need to be documented. In most cases, a check mark (✓) indicates within normal limits, an arrow (→) indicates no change from previous assessment, and an asterisk (*) indicates any deviation in status since previous assessment. Any (*) needs to be clearly documented.

General Report (Make Copies for Multiple Pts)

Name	Age	Sex	Rm#
Diagnosis		Code Status	
Admit Date	Dr.		
Procedure			
Neurologic			
Respiratory			
CV			
GI-GU			
MS			
Pain			
Skin			
Incision-Dressing			
I & O			
IVs	LTC		
Diet-NPO			
Activity			
Labs-Procedures			
Miscellaneous			
D/C Planning-Teaching Needs			

Pediatric Quick Reference (Vitals-Equipment-Electricity)

Age	Term	2 mo	4 mo	6 mo	1 yr	3 yr	6 yr	8 yr	10 yr	11 yr	12 yr
Length (inches)	18-20	20-22	22-24	24-27	27-30	30-33	33-38	38-43	43-48	48-52	>52
Weight (lb)	7	9	11	13-15	18-20	22-24	26-31	33-40	42-48	53-62	66-79
Weight (kg)	3	4	5	6-7	8-9	10-11	12-14	15-18	19-22	24-28	30-36
SBP (lower limit)	>60	>60	>60	>60	>70	>76	>82	>86	>90	>90	>90
SBP (critical)	<50	<50	<50	<50	<50	<50	<60	<60	<70	<70	<70
Heart rate	85-205	85-205	99-190	99-190	99-190	60-140	60-140	60-140	60-100	60-100	60-100
Respiratory rate	30-60	30-60	30-60	30-60	24-40	22-34	18-30	18-30	18-30	18-30	12-16
Laryngoscope blade*	*straight blade										
	*straight or curved										
ET tube (mm, cuffed)	1	1	1	1	1	1	2	2	2	2	3
ET tube (mm, uncuffed)	3.0	3.0	3.0	3.0	3.0	4.0	4.5	5.0	5.5	6.0	6.0
ETT insertion depth (mm, uncuffed)	3.5	3.5	3.5	3.5	4.0	5.0	5.5	6.0	6.5	7.0	7.0
ETT insertion depth (cm at gums/teeth)	9-10.5	9-10.5	9-10.5	9-10.5	9-12	12-15	14-17	15-18	17-20	18-21	18-21
Defibrillate: 2 J/kg	6	8	10	13	17	20	26	33	40	53	66
Defibrillate: 4 J/kg	12	16	20	26	34	40	52	66	80	106	132
Cardiovert: 0.5-1 J/kg	3	4	5	7	9	10	13	17	20	27	33
Cardiovert: 2 J/kg	6	8	10	13	17	20	26	33	40	53	66

Pediatric Advanced Life Support

Bradycardia (HR <60 bpm)

Asymptomatic

- Observe and support ABCs as needed.

Symptomatic—Severe Cardiopulmonary Compromise

- **Chest compressions:** 100/min; ratio: 30:2 (15:2 if two rescuers).
- **Epinephrine: IV or IO** [1:10,000] 0.01 mg/kg (0.1 mL/kg) every 3–5 min.
ET [1:1,000] 0.1 mg/kg (0.1 mL/kg) every 3–5 min.
- **Atropine:** 0.02 mg/kg IV or IO, may repeat one time. Minimum single dose is 0.1 mg. Max total dose is 1 mg.
- **Consider cardiac pacing:** Same as adults, but use pediatric pads, placed anterior-to-posterior, set rate to 100 bpm.

Note: If bradycardia is caused by suspected increased vagal tone or primary AV block, give atropine as first-line drug.

Tachycardia—Poor Perfusion*

Narrow Complex (≤ 0.08 sec)

- 12-lead to evaluate tachycardia if clinically practical.
- Consider vagal maneuvers.
- **Immediate cardioversion:** 0.5–1 J/kg, (repeat at 2 J/kg); *or*
- **Adenosine:** 0.1 mg/kg (max 1st dose 6 mg) rapid IV push. May give 2nd dose at 0.2 mg/kg (max 2nd dose 12 mg).

Wide Complex (>0.08 sec)

- **Immediate cardioversion:** 0.5–1 J/kg, (repeat at 2 J/kg).
- **Antiarrhythmic:** Consider *one* of the following:
 - **Amiodarone:** 5 mg/kg IV, IO bolus over 20–60 min; *or*
 - **Procainamide:** 15 mg/kg IV or IO over 30–60 min.

Cardiac Arrest

V-Fib/Pulseless VT

- **Defibrillate:** Initially 2 J/kg; all subsequent shocks at 4 J/kg.
- **CPR (5 cycles):** Rate: 100/min; ratio: 30:2 (15:2 if two rescuers).
- **Defibrillate:** 4 J/kg then resume CPR immediately.

*If tachycardia is associated with adequate perfusion, consider pharmacological cardioversion before electrical cardioversion.

- **Epinephrine: IV or IO** [1:10,000] 0.01 mg/kg (0.1 mL/kg) every 3–5 min.
ET [1:1,000] 0.1 mg/kg (0.1 mL/kg) every 3–5 min.
- **Defibrillate:** 4 J/kg then resume CPR immediately.
- **Antiarrhythmic:** Consider **one** of the following:
 - **Amiodarone:** 5 mg/kg IV, IO bolus; *or*
 - **Lidocaine:** 1 mg/kg (max 100 mg) IV, IO, ET (2 mg/kg); *or*
 - **Magnesium:** (*if Torsades*) 25–50 mg/kg IV, IO (max 2 g).

Asystole—Pulseless Electrical Activity (PEA)

- **CPR** (5 cycles): Rate: 100/min; ratio: 30:2 (15:2 if two rescuers).
- **Epinephrine: IV or IO** [1:10,000] 0.01 mg/kg (0.1 mL/kg) every 3–5 min.
ET [1:1,000] 0.1 mg/kg (0.1 mL/kg) every 3–5 min.
- **Continue CPR:** Perform 5 cycles and then reassess rhythm.

Initial Steps to Neonatal Resuscitation¹

Assess respirations, HR, and color.

30 sec	<ul style="list-style-type: none"> • Temperature: Provide warmth (dry, use radiant warmer). • Airway: Position on back or side, neck slightly extended in a “sniffing” position and suction (mouth first, then nose). • Dry, stimulate,* reposition. <p><i>*If meconium present, and baby is not vigorous, suction mouth and trachea first.</i></p>
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If baby fails to improve (apnea, cyanosis, HR <100).

30 sec	<ul style="list-style-type: none"> • Breathing: Positive pressure ventilation (PPV) at 40–60 breaths/min with 100% oxygen using infant BVM.
--------	---

If HR remains <60 bpm, despite adequate ventilation/O₂.

30 sec	<ul style="list-style-type: none"> • Circulation: Chest compressions at 120 events/min (three compressions with one ventilation every 2 sec). • Drugs: Reassess efforts, intubate, and administer drugs. <ul style="list-style-type: none"> • Epinephrine (1:10,000): 0.1–0.3 mL/kg IV (0.3–1 mL/kg ET). • NS: 10 mL/kg IV, IO, or umbilicus over 5–10 min. • Naloxone: 0.1 mg/kg IV, IM (for respiratory depression despite PPV and maternal narcotic within last 4 hours).
--------	--

Note: Consider intubation at any step during resuscitation.

Text rights not available.

Rapid Newborn Drug Reference

Note: Follow all drugs with 0.5–1.0 mL normal saline flush.

- **Adenosine:** [SVT] 0.1 mg/kg IV, IO; 2nd dose 0.2 mg/kg.
- **Atropine:** [RSI, 2nd-line bradycardia] **IV, IO:** 0.02 mg/kg (minimum 0.1 mg; max 0.5 mg); **ET:** 0.03 mg/kg.
- **Dextrose 10% (D10):** [hypoglycemia] 0.2 g/kg IV only.
- **Diazepam:** [seizures] **IV, IO:** 0.2 mg/kg; **Rectal:** 0.5 mg/kg.
- **Dopamine:** [hypotension] 2–20 mcg/kg/min IV infusion.
- **Epinephrine (1:10,000):** [bradycardia, asystole] 0.1–0.3 mL/kg IV, IO, umbilicus (consider 0.3–1 mL/kg for ET route).
- **Flumazenil:** [benzodiazepine OD] 0.01 mg/kg IV, IO.
- **Naloxone:** [narcotic OD] 0.1 mg/kg rapid IV, IO, IM.
- **NS or LR:** 10 mL/kg IV, IO, or umbilicus over 5–10 min.
- **Phenobarbital:** [seizures] 20 mg/kg slow IV, IO (1 mg/kg/min).
- **Phenytoin:** [seizure] 15 mg/kg IV, IO (loading dose).
- **Lidocaine:** [VF/Pulseless VT] **IV, IO:** 1 mg/kg; **ET:** 2–3 mg/kg.
- **Lorazepam:** [seizures—2nd line] 0.05–0.1 mg/kg IV, IO.
- **Sodium bicarbonate 4.2%:** [confirmed acidosis] 1 mEq/kg slow IV, IO (dilute 8.4% with equal amount of NS for 4.2%).

Pediatric Formulas (>1 year)

Systolic BP*	$(2 \times \text{Age in years}) + 90$
Diastolic BP*	Approximately 2/3 of the SBP
Weight (kg)	$(2 \times \text{Age in years}) + 8$
ET tube size (uncuffed)	$(\text{Age in years} \div 4) + 4$
ET tube size (cuffed)	$(\text{Age in years} \div 4) + 3$
ET tube depth of insertion	$3 \times \text{ET size}$
Suction catheter (French)	$2 \times \text{ET size}$
Fluid bolus	10–20 mL/kg

*Capillary refill is acceptable for children less than 3 years old.

Pediatric IM Injections

	Muscle	Needle	Max Volume
Infant	Ventrogluteal or vastus lateralis	5/8"–7/8"	1 mL
Toddler	Ventrogluteal or vastus lateralis	5/8"–1"	1 mL
Older child	Ventrogluteal or deltoid	5/8"–1"	1 mL

Pediatric Trauma Score

	+2	+1	–1	Score
Weight	>20 kg	10–20 kg	<10 kg	
Airway	Normal	Maintained	Unmaintained	
SBP	>90	50–90	<50	
LOC	Awake	Obtunded	Unresponsive	
Open wounds	None	Minor	Major	
Fractures	None	Closed	Open, multiple	
Transfer to trauma center if score is 8 or less.				Total

Pregnancy

Terms Associated With Pregnancy

Abortion	spontaneous or induced termination of pregnancy before fetus reaches viability
Chloasma	mask of pregnancy
Crowning	presentation of fetal head at vaginal introitus
CST	contraction stress test
Deceleration	decrease in fetal heart rate
Dilation	widening of cervical os and canal
Eclampsia	seizures secondary to hypertension
EDD or EDC	estimated date of delivery or confinement
Embryo phase	weeks 3–8
Effacement	shortening and thinning of cervix
Fetus phase	from week 9 until delivery
FHR	fetal heart rate
FHT	fetal heart tone
Gravida NCLEX	number of all pregnancies, regardless of outcome, including current pregnancy (gravidity)
GTPAL NCLEX	gravidity, term births, preterm births, abortions or miscarriages, living children
HCG	human chorionic gonadotropin
HELLP	hemolysis, elevated liver enzymes, lowered platelets (bleeding disorder similar to DIC)
Homans' sign	pain elicited by dorsiflexion of foot
Hyperemesis gravidarum	excessive nausea and vomiting in early pregnancy
IDM	infant of diabetic mother
Involution	return of uterus to nonpregnant size
Lanugo	soft downy body hair of newborn infant
LGA	large for gestational age
LNMP (LMP)	last normal menstrual period
L:S ratio	lecithin/sphingomyelin ratio: determines fetal lung maturity (2:1 ratio is desirable)
MAB	miscarriage abortion
Macrosomia	birth weight >4000 grams

Meconium	fetal defecation while in utero at time of labor that occurs with fetal distress
Miscarriage	spontaneous abortion
Multigravida	has been pregnant more than once
Multipara	two or more pregnancies beyond 20 weeks
Nidation	implantation: occurs 7 to 10 days after conception
NST	nonstress test
Nullipara	never produced a viable offspring
OCT	oxytocin challenge test
Operculum	mucus plug
Organogenesis NCLEX	weeks 3–8
Para	number of viable births >20 weeks (parity)
Pica	ingestion of nonnutritive substances
PIH	pregnancy-induced hypertension (see pre-eclampsia this section)
Post-term	gestation lasting longer than 42 weeks
POC	product of conception
Pre-eclampsia	mild: $\geq 140/90$ mm Hg; severe: $\geq 160/110$ mm Hg
Pre-term	born before beginning of 38th week
Primigravida	first pregnancy ever
Primipara	only one pregnancy carried past 20 weeks
PTL	preterm labor
Puerperal period	≤ 21 –42 days postpartum
ROM	rupture of membranes (1000 mL at term)
SGA	small for gestational age
Station, fetal	relation of presenting part to maternal pelvic ischial spines
Striae	stretch marks
Supine hypotension	caused by compression of vena cava; relieved by positioning mother in lateral recumbent position
Tab	therapeutic abortion
Teratogenic	harmful to developing embryo
TPAL NCLEX	term, preterm births, abortions or miscarriages, living children
Trimester	one of three phases of pregnancy, each consisting of 13 weeks

- Variability** refers to irregularities in fetal heart rate
- Vernix** cheeselike coating on newborn's skin
- Viability** pregnancy lasting beyond 20 weeks of gestation
- Viable fetus** uncompromised fetus beyond 20 weeks

NCLEX Predicting Due Date (Nägele's Rule)

- Add 7 days to first day of LMP.
- Subtract 3 months.
- Add 1 year.
- See example to right. →
- 1st day of LNMP = 7/14/07
- Add 7 days = 7/21/07
- Subtract 3 months = 4/21/07
- Add 1 year (EDD) = 4/21/08

NCLEX Fetal Development Timetable

4 weeks 0.4 cm, 0.4 g	24 weeks28 cm, 780 g
8 weeks 3 cm, 2 g	28 weeks38 cm, 1200 g
12 weeks 8 cm, 19 g	32 weeks40 cm, 2000 g
16 weeks 12.5 cm, 100 g	36 weeks42 cm, 2500 g
20 weeks 19 cm, 465 g	40 weeks50 cm, 3200 g

Normal Changes Throughout Pregnancy

Cardiovascular

- Heart rate increases
- Blood pressure lower first half, no change last half
- Blood volume as much as a 50% increase
- Hgb and Hct decrease
- RBC as much as a 30% increase
- WBC increases
- Vasodilatation caused by increased progesterone levels
- Stroke volume increases
- CO increases
- SVR decreases
- Supine position decreases perfusion to baby

Respiratory

- Respiratory rate increases
- Oxygen consumption increases by 15%
- Tidal volume increases

- Functional residual capacity decreases
- Dyspnea normal at end of third trimester
- pH increases
- PaO₂ increases
- PaCO₂ decreases
- HCO₃ decreases

Renal

- Proteinuria may indicate possible PIH
- GFR increases by as much as 50%

Metabolic

- Temperature slight increase
- Blood glucose increase may indicate gestational diabetes

Hormones Associated With Pregnancy

- Follicle-stimulating hormone (FSH) ... follicle growth and maturation
- Luteinizing hormone (LH) egg development and ovulation
- Progesterone maintains pregnancy
- Prolactin ... initiation and continuation of milk production (lactation)
- Oxytocin stimulates uterine contractions and milk let-down

Weight Gain and Nutritional Requirements

Optimal Weight Gain

- **NCLEX** Total weight gain during pregnancy 25–35 lb
- First trimester about 2–3 lb
- Second–third trimester 3/4 lb every week

Nutritional Requirements

- **NCLEX** Additional caloric needs 300 cal/day (2500 total)
- Protein 75 grams/day
- Carbohydrates 175 grams/day (mostly complex)
- Fiber 28 grams/day
- Fats 20–35 grams/day
- Sodium should not be restricted unless under MD guidance
- Iron 27 mg/day
- Calcium 1000 mg/day
- Folic acid 600 mcg/day (500 mcg/day while lactating)
- Daily fluid intake ~3 L/day unless pre-eclampsia exists

Immunization During Pregnancy • 2009

Recommended

For persons who meet age requirement and who lack evidence of immunity, e.g., documentation.

- Tetanus and diphtheria (Td)
- Influenza

Recommended Only If Medical or Exposure Indication Exists

- Pneumococcal
- Hepatitis A
- Hepatitis B
- Meningococcal

Contraindicated During Pregnancy

- Varicella
- Zoster
- MMR (measles, mumps, rubella)

Source: Adapted from the recommendations of the CDC; <http://www.cdc.gov/mmwr/PDF/wk/mm5753-Immunization.pdf>


Progression of Labor



Factors Affecting Progression of Labor (Four Ps)

- **Passenger:** Size of baby and its head, fetal presentation, lie, attitude, and position in relation to birth canal.
- **Passageway:** Size of birth canal in relation to baby.
- **Power:** Force, regularity, and duration of contractions.
- **Psychological:** Pain and anxiety experienced by mother including preparation for delivery and support system.

Stages of Labor

Stage I 	From onset of contractions through full effacement and dilatation of cervix (latent phase, 0–3 cm; active phase, 4–7 cm; transition phase, 8–10 cm). Duration: 8–18 hours.
Stage II	From full dilatation of cervix until delivery of baby. Duration: 15–90 minutes.
Stage III	From birth of baby until expulsion of placenta. Duration: ≤20 minutes.
Stage IV	First 1–2 hours after expulsion of placenta.

Comparison of True and False Labor

	True Labor	False Labor
Contractions	Consistent pattern	Inconsistent pattern
Frequency of contractions	Progressively increasing	Inconsistent
Duration of contractions	Progressively increasing	Inconsistent
Intensity of contractions	Progressively increasing; increases with walking	Inconsistent; subsides or does not increase with walking
Cervix	Progressive effacement and dilation	No significant change
Discomfort	Mostly low back and abdominal	Mostly abdominal and groin

Fundal Height Assessment

- Measured to assess fetal growth and development.
- Using cm ruler, measure from top of symphysis pubis to top of fundus (subtract one cm if very obese).
- Measurements greater than 4 cm from estimated gestational age require further evaluation.

Gestation (weeks)	12	16	20	24	28	32	36	40
Height (cm)	11–13	15–17	19–21	23–24	27–29	31–33	35–37	33–35

Electronic Fetal Monitoring**Fetal Heart Rate (FHR)**

Baseline	<ul style="list-style-type: none"> • HR between contractions.
Normal	<ul style="list-style-type: none"> • 120–160 bpm (can be higher for short periods of time, less than 10 minutes).
Tachycardia	<ul style="list-style-type: none"> • Sustained FHR >160 for more than 10 minutes. • Common etiology can include early fetal hypoxia, immaturity, amnionitis, maternal fever, and terbutaline (Brethaire).
Bradycardia	<ul style="list-style-type: none"> • Sustained FHR <120 for more than 10 minutes. • Common etiology can include late or profound fetal hypoxia, maternal hypotension, prolonged umbilical cord compression, and anesthetics.

Variability (Cardiac Rhythm Irregularities)

None	<ul style="list-style-type: none"> • 0–2 variations per minute (abnormal).
Minimal	<ul style="list-style-type: none"> • 3–5 variations per minute (abnormal).
Average	<ul style="list-style-type: none"> • 6–10 variations per minute (normal).
Moderate	<ul style="list-style-type: none"> • 11–25 variations per minute (normal).
Marked	<ul style="list-style-type: none"> • More than 25 variations per minute (abnormal).

Deceleration (Decrease in Fetal Heart Rate)

	Etiology	Management
Early Decelerations <ul style="list-style-type: none"> • Mirror image of contraction. • Starts and stops with contractions. 	<ul style="list-style-type: none"> • Head compression. 	<ul style="list-style-type: none"> • Observation.
Late Decelerations <ul style="list-style-type: none"> • Reverse mirror image of contractions. • Starts after contraction begins and stops after contraction has ended. 	<ul style="list-style-type: none"> • Uteroplacental insufficiency. 	<ul style="list-style-type: none"> • Lateral position. • Stop or slow pitocin. • Oxygen. • IV fluids. • C-section if not corrected.

	Etiology	Management
Variable Deceleration Pattern <ul style="list-style-type: none"> Occurs at unpredictable times during contractions. Size and shape vary. 	<ul style="list-style-type: none"> Cord compression. 	<ul style="list-style-type: none"> Lateral or Trendelenburg position. Oxygen. C-section if not corrected.

Complications of Pregnancy



Gestational Diabetes

Definition: Maternal hyperglycemia (insulin resistance that begins or is first diagnosed during pregnancy).

Incidence: Occurs in about 4% of all pregnancies.

Onset: Usually between 24th and 28th week of pregnancy.

Etiology: placental hormones (estrogen, cortisol, and human placental lactogen) make cells more resistant to insulin. Risk factors include a history of DM, obesity, and >35 years of age.

Symptoms: Polydipsia, polyuria, polyphagia, weight loss, fatigue, nausea, vomiting, frequent infections, blurred vision.

Complications

- **Neonatal hypoglycemia:** Caused by a sudden drop in glucose, once supplied by mother, coupled with continuation of insulin production. Infants must be monitored and treated aggressively.
- **Macrosomia:** Caused by excess insulin secreted by fetus in response to elevated maternal blood glucose levels. Excess insulin acts like a growth hormone, resulting in a fetus that is more than 4500 grams (LGA) and may require a c-section.

Collaborative Care

- Goal of treatment is to maintain blood glucose levels within normal limits (70–105 mg/dL) during pregnancy.
- Frequent prenatal visits for monitoring of maternal blood glucose levels.
- Fetal growth and development is monitored using ultrasound and nonstress tests (NST) to measure movement and FHR variations.
- Dietary modifications and an exercise program are prescribed.
- If dietary management fails, mother may be started on SC insulin.
- Obtain and document blood glucose levels at prenatal visits.

- Assess and document fetal development (fundal height, etc.).
- Provide Pt and family with literature on gestational diabetes.
- Encourage dietary modifications including foods high in nutrition and low in fat and calories such as fruits, vegetables, and whole grains, and stress importance of avoiding refined sugars.
- Encourage aerobic activity (30–45 minutes most days of the week).
- Explain actions, dosages, side effects, and adverse reactions of meds.

NCLEX Placenta Previa

Definition: Implantation of placenta in lower segment of uterus, causing partial or complete coverage of cervical os.

Incidence: Occurs in about 1 out of 200 term deliveries and is more likely to affect multipara women and women >35 years of age.

Onset: Bleeding often occurs as early as 28 weeks, but may not occur until onset of labor, depending on type of placenta previa.

Etiology: Unknown.

Symptoms: Painless, bright red bleeding, usually after week 28.

Four Types of Placenta Previa

Low-lying: Implants in lower uterine segment, but does not reach cervical os—usually without associated complications.

Marginal: Edge of placenta is at edge of internal os. Mother may be able to deliver vaginally.

Partial: Partial coverage of cervical os. Bleeding occurs during dilatation and effacement; c-section usually required.

Total: Total coverage of cervical os; usually requires emergency c-section.

Collaborative Care

- Maintenance IV, bedrest, and electronic fetal monitoring (EFM).
- For fetal distress, mother is placed in left lateral position, administer high-flow oxygen, IV fluids, and notify physician STAT.
- Once bleeding has ceased for more than 24–48 hours, and neither mother nor fetus are in any distress, Pt may be discharged to home on bedrest.
- Monitor mother's vital signs and fetus for any signs of distress (variability, late decelerations, increase or decrease in HR).
- Monitor for bleeding, noting amount and character of blood loss.
- Continue monitoring for signs of hypovolemic shock.
- Maintain bedrest in left lateral position to enhance venous return and perfusion to placenta.

- Provide Pt and family with literature on placenta previa.
- If Pt is discharged prior to delivery, instruct her to notify her physician immediately for any vaginal bleeding, decreased fetal activity, spontaneous rupture of membranes, or contractions.
- Stress importance and benefits of lying in left lateral position.
- Instruct Pt to abstain from sexual intercourse.



Placenta Abruptio

Definition: Premature separation of placenta from uterine wall.

Incidence: Occurs in about one out of 120 deliveries and is more likely to affect multipara women and women >35 years of age.

Onset: May occur during prenatal or intrapartum period.

Etiology: Unknown; pre-eclampsia and HTN are possible causes.

Symptoms: Dark red vaginal bleeding (may be concealed), severe tearing sensation, abdominal and lower back pain, signs of shock.

Four Grades of Abruptio

Grade-0: <10% detachment, mother and fetus are asymptomatic, small retroplacental clot is noted at birth.

Grade-I: 10%–20% detachment, mild bleeding and uterine tenderness, mother and fetus are in no distress.

Grade-II: 20%–50% detachment, uterine tenderness and tetany, signs of fetal distress are noted, but mother is not in hypovolemic shock.

Grade-III: >50% detachment, severe uterine tenderness and tetany, hemorrhage, shock, and fetal death. Coagulopathy (HELLP syndrome) is likely to occur.

Collaborative Care

- Continuous internal fetal monitoring for signs of distress.
- Supplemental oxygen is administered and IV access is established.
- Labs include CBC, coagulation studies, type and crossmatch.
- Vaginal delivery if mother and fetus are not in any distress.
- Emergency c-section if mother and fetus are in distress.
- Blood transfusion may be given for excessive hemorrhage.
- If mother and fetus are stable and pregnancy is <28 weeks along, mother will be discharged home on tocolytic medications (to inhibit uterine contractions).
- Position Pt on left side if fetus is showing signs of distress.
- Vital signs and mother are monitored closely for signs of shock.

- Assess for signs of occult bleeding: rigid, board-like abdomen, constant abdominal pain, increased fundal height, late decelerations or decreased variability of FHR.
- Provide Pt and family with literature on placenta abruptio.
- Instruct Pt to notify physician of any cramping or bleeding.
- Explain actions, dosages, side effects, and adverse reactions of meds.

PLACENTA ABRUPTIO VERSUS PLACENTA PREVIA

	Placenta Abruptio	Placenta Previa
Onset	May occur during prenatal or intrapartum period.	Bleeding often occurs as early as 28 weeks, but may not occur until onset of labor.
Neuro	Anxiety, fear, restlessness.	Anxiety, fear, restlessness.
Resp	Tachypnea if in shock.	Usually unremarkable.
CV	Signs of shock.	May exhibit shock.
Skin	Cool, pale, diaphoretic.	Usually unremarkable.
GI/GU	Dark red vaginal bleeding. Bleeding may be concealed, depending on grade of abruptio.	Painless, bright red bleeding.
MS (pain)	Severe tearing sensation, abdominal and low back.	Usually unremarkable.

NCLEX Pre-eclampsia

Definition: Multisystem disorder of pregnancy characterized by a classic triad of symptoms: hypertension, proteinuria, and edema.

Incidence: Occurs in 7% of all pregnancies and is more likely to affect pregnant adolescents and women >35 years of age.

Onset: Week 20 and continuing throughout pregnancy, throughout labor, and up to 6 weeks postpartum.

Etiology: Unknown.

Symptoms: HTN, edema, proteinuria, hyperreflexia, clonus, HA, visual disturbances, vasospasm, decreased UO, seizures.

Mild Pre-eclampsia	Severe Pre-eclampsia
<ul style="list-style-type: none"> • BP >140/90 and <110/160 • 1+ to 2+ protein in urine • Protein <5 grams/24-hr urine 	<ul style="list-style-type: none"> • BP > 110/160 • 3+ to 4+ protein in urine • Protein >5 grams/24-hr urine

Collaborative Care

- In mild cases, mother is treated at home on bedrest with education about warning signs and need for frequent prenatal visits.
- In moderate to severe cases, mother is hospitalized on complete bedrest for continuous monitoring and management.
- IV infusion of magnesium may be started to prevent seizures.
- Glucocorticoid steroids may be given IM 48 hours prior to delivery to assist in maturing fetal lung development.
- A c-section is performed if pre-eclampsia is severe and not responding to treatment or if fetus is showing signs of distress.

Nursing Focus

- Maintain Pt on bedrest in left lateral position.
- Reduce environmental stimuli and encourage rest.
- Keep bed in lowest position, side rails up and covered with pads.
- Assess VS, daily weight, I & O, UO, labs, neurological status.
- Assess edema, deep tendon reflexes, and presence of clonus.
- During labor, monitor FHR, contractions, and monitor for seizures.

Patient Teaching

- Provide Pt and family with literature on pre-eclampsia.
- Stress importance and benefits of lying in left lateral position.
- If Pt to be treated at home, instruct her to notify nurse or physician immediately for any of the following symptoms: HA, visual disturbances, sudden weight gain, AMS, decreased UO, RUQ pain, facial edema, or decreased fetal activity.



Hyperemesis Gravidarum

Definition: Intractable nausea and vomiting during first trimester that adversely affects nutrition and causes fluid and electrolyte imbalances.

Onset: Anytime during pregnancy.

Neuro: Fatigue, malaise.

CV: Hypotension, tachycardia.

F and E: Dehydration, electrolyte imbalances.

GI/GU: Nausea and vomiting.

Collaborative Care

- Antiemetics are prescribed.
- IV fluids may be administered for dehydration or electrolyte imbalance.
- In severe cases, total parenteral nutrition (TPN) may be required.

Nursing Focus

- Place mother in position of comfort, ideally on left side to relieve compression of IVC and enhance venous return and uteroplacental perfusion.
- Monitor labs and I & O for signs of dehydration, malnourishment, and electrolyte imbalance.
- Implement fetal monitoring (e.g., FHR, activity, etc.).

Patient Teaching

- Provide Pt and family with literature on hyperemesis gravidarum.
- Stress importance and benefits of eating small frequent meals consisting of low-fat, easily digestible carbohydrates.
- Avoid lying flat too soon after eating and drinking liquids between meals.

NCLEX

Supine Hypotensive Syndrome

Definition: When a pregnant woman lies on her back, the heavy gravid uterus compresses the IVC and results in pooling of blood in legs, decreased venous return, a fall in CO, and hypotension.

Onset: Becomes more pronounced as pregnancy progresses.

Neuro: Dizziness, syncope, fatigue.

CV: Hypotension, tachycardia.

Skin: Pallor, diaphoresis.

GI/GU: Nausea.

Nursing Focus

- Position mother on left side to relieve compression of IVC and enhance venous return and uteroplacental perfusion.
- Monitor vital signs.

Patient Teaching

- Provide Pt and family with literature on supine hypotensive syndrome.
- Stress importance and benefits of lying in left lateral position.

Emergency Delivery

Clinical Findings (Imminent Delivery)

- Contractions are usually regular, <2 minutes apart and progressively increasing in frequency and duration.
- Low-back and abdominal pain and/or cramping.
- Urge to have bowel movement or strong urge to push.
- Bulging vaginal opening or crowning of baby's head.

Emergency Management

- Assess contractions (regularity, duration, and frequency).
- Assess status of membranes—manually rupture if intact.
- Instruct Pt to take slow, deep breaths during contractions.
- If birth imminent, instruct Pt to push during contractions.
- Discourage pushing between contractions.
- With gloved hand, apply gentle pressure against baby's head to prevent explosive delivery and tearing of perineum.
- **Head:** As head delivers, examine neck for looped cord and gently slip it over baby's head if present.
- Suction mouth first, and then nose, before next contraction (tear away amniotic sac if covering face).
- **Shoulders:** Position hands on either side of baby's head and (1) gently guide baby downward until upper shoulder emerges, then (2) guide baby upward as body emerges.
- Keep baby at same level as perineum until cord is cut.
- Hypothermia can occur rapidly in newborns; dry and wrap baby's body and head (**not face**) in dry, warm blankets.
- Reassess airway and suction mouth and nose as needed.
- Stimulate respirations with vigorous rubbing and drying.
- **Cord:** Clamp at 8 and 10 inches from baby (cut in between).
- Position baby (skin-to-skin) on mother's abdomen or chest.
- Do not pull on umbilical cord if placenta has not delivered.
- Encourage breastfeeding or massage mother's abdomen to stimulate uterine contractions.
- Assess cord vessels—normally 3 vessels (1 vein, 2 arteries).
- Save placenta for analysis by receiving hospital physician.
- Document APGAR at 1 and 5 minutes postpartum.
- Assess for postpartum complications (e.g., hemorrhage).

Complicated Delivery

Meconium-Stained Amniotic Fluid

During Delivery

- Suction mouth first, then nose, with a bulb syringe prior to delivery of shoulders to prevent aspiration of meconium.

After Delivery

- If baby not vigorous, minimize stimulation and delay ventilation until meconium can be suctioned from airway.

If baby Is Depressed (HR <100, depressed RR/muscle tone)

- Intubate newborn's trachea, but **DO NOT** ventilate.
- Apply suction and withdraw ET tube to clear meconium.
- Repeat process until no further meconium can be suctioned.
- During process, administer 100% O₂ via blow-by.
- Ventilate newborn using bag-valve device after suctioning.



Cord Presentation (Prolapsed Cord)

- Trendelenburg position (left-lateral if birth not imminent).
- Relieve cord pressure with gentle pressure to baby's head.
- Monitor cord pulses and cover with saline-soaked gauze.
- Do not attempt to push cord back into uterus.
- Discourage mother from pushing during contractions to minimize cord pressure (panting instead, will help to avoid pushing).
- Prepare for emergency c-section.

Breech Presentation

Buttocks First

- If baby has delivered to level of umbilicus, gently extract baby's legs.
- Gently extract enough cord in order to relieve tension on cord during delivery.

Both Feet First

- Support baby's legs and buttocks and gently pull during contractions until shoulders delivered.
- Avoid pulling on baby once shoulders have delivered.
- Place gloved fingers between baby's face and vaginal wall to create an airway for baby until head delivers.
- Prepare for emergency c-section.

Limb Presentation

- Place mother in Trendelenburg position to slow delivery.
- Support presenting limb and assess pulse if possible.
- Discourage mother from pushing during contractions (panting instead, will help to avoid pushing).
- Prepare for emergency c-section.

Vaginal Bleeding

Do not perform vaginal examination nor attempt vaginal packing.

Antepartum (Before Delivery)

- Apply perineal pad; note time to assess amount of bleeding.
- **Position mother on left side!** Relieves compression of IVC and enhances venous return and uteroplacental perfusion.
- Prepare for emergency c-section if necessary.

NCLEX Postpartum Hemorrhage

- Massage mother's fundus (abdomen) or encourage breastfeeding if appropriate to stimulate uterine contractions.
- Control external bleeding with direct (external) pressure.
- Place mother in Trendelenburg position.
- Establish 2nd large-bore IV and titrate to SBP >90 mm Hg.
- **Oxytocin may be prescribed:** (postpartum hemorrhage only!) 10 units mixed in 1000 mL of LR titrated to affect (give 3–10 units IM if no IV access).

Newborn—Initial Care and Assessment

NCLEX ABCs and Temperature

- Baby should be pink (for dark-skinned Pts, assess oral mucosa, conjunctivae, palms, soles of feet, etc.) and have a loud, vigorous cry.
- Suction nose and mouth to clear excess secretions, mucus.
- Stimulate breathing with vigorous rubbing and drying.
- **NCLEX** Dry baby and maintain warmth (wrap in blankets, warmer, etc.).

APGAR and Vital Signs (see APGAR Score)

- **NCLEX** Assess and document APGAR at 1 and 5 minutes after delivery.
Note: Some hospitals also require a 10-minute APGAR score.
- **NCLEX** Assess and record vital signs (see normal ranges below).

Preterm	RR: 50–70	HR: 140–180	SBP: 40–60	T: 36.8–37.5°C
Newborn	RR: 30–60	HR: 120–160	SBP: 60–90	T: 36.8–37.5°C

Identification and Infant Safety

- **NCLEX** Place ID bands on baby and mother immediately after delivery.
- Record baby's footprints in chart.
- **NCLEX** Always transport newborn in a bassinet.
- **NCLEX** Only staff with proper identification may take newborn from mother.

Measurements

- **Weight:** Normal is 6–10 lb.
- **Length:** Normal is 18–22 in.
- **Head circumference:** Normal is 13–14 in. (33–35 cm).
- **Chest circumference:** Normal is 12–13 in. (30–33 cm).

Physical Assessment

Note: Perform regular, head-to-toe assessment, similar to an adult, but note the following areas specific to newborn assessment.

- **Appearance:** Baby should be pink (for dark-skinned Pts, assess oral mucosa, conjunctivae, palms, soles of feet, etc.), have a loud, vigorous cry, and be well flexed with full ROM and spontaneous movements.
- **NCLEX Fontanels:** Anterior is diamond-shaped, ~4 cm at widest point (closes at 12–18 months); posterior is triangular, ≤1 cm at widest point (closes at 2–3 months).
- **Molding:** Skull may be oddly shaped with overlapping cranial bones.
- **Mouth:** Inspect mouth for cleft lip and/or cleft palate.
- **Heart murmur:** Soft murmur considered normal in first few days.
- **Breathing:** Abdominal breathing normal in newborns.

- **NCLEX Umbilical cord:** Should have one vein and two arteries. Should be clamped, may or may not be pulsating, and no sign of bleeding.
- **Extremities:** Legs and arms equal length to each other and all fingers and toes accounted for.
- **Male genitalia:** Testes palpable in scrotum or inguinal canal.
- **Female genitalia:** Large labia minora and vaginal discharge of blood or mucus considered normal.

Routine Newborn Medication and Labs

- **NCLEX Eyes:** Medicated with antibiotic ointment per hospital policy.
- **NCLEX Vitamin K injection:** Given to prevent hemorrhage.
- **PKU (phenylketonuria):** Should be obtained 24 hours after feeding begins. Normal serum blood level is <4 mg/dL. Sample is obtained from heel stick.
- **Coombs' test:** Done if mother's blood is Rh negative. Determines if mother has formed harmful antibodies against her fetus' RBCs and transferred them to her baby via placenta. Heel stick sample.
- **NCLEX Immunizations:** Physician may order first hepatitis B vaccine (Hep-B) to be given soon after birth, before discharge.

APGAR Score

Appearance (color)	1 minute	5 minutes
• Pink torso and extremities		
• Pink torso, blue extremities		
• Blue all over		
Pulse (heart rate)	1 minute	5 minutes
• >100		
• <100		
• Absent.....		
Grimace (irritability/reflexes)	1 minute	5 minutes
• Vigorous cry		
• Limited cry		
• No response to stimulus.....		

Continued

Activity (muscle tone)	1 minute	5 minutes
• Actively moving.....2		
• Limited movement1		
• Flaccid.....0		
Respiratory Effort	1 minute	5 minutes
• Strong loud cry2		
• Hypoventilation, irregular.....1		
• Absent.....0		
.....Totals*		

*8–10, normal; 4–6, moderate depression; 0–3, aggressive resuscitation (see Initial Steps to Neonatal Resuscitation).

Source: Apgar V. A proposal for a new method of evaluation of the newborn infant. Curr Res Anesth Analg. 1953; 32:260–267.

Infant Reflexes			
Reflex	Stimulation	Response	Age
Babinski	Stroke sole of foot.	Toes open/fan upward.	0–12 mo
Galant	Stroke along spine.	Back arches toward stimulus.	0–6 mo
Grasping (palmar)	Place object in palm.	Grasping objects.	0–6 mo
Moro (startle)	Loud noise.	Rapid outward extension of arms followed by a return to midline.	0–2 mo
Parachute	Suspended in prone position (as if falling).	Extension of extremities.	8 mo–adult
Plantar	Stroke ball of foot.	Toes curl downward.	0–12 mo
Rooting	Stroke cheek.	Turns toward stimulus.	0–4 mo
Sucking	Stroke area around mouth.	Begins to suck.	0–4 mo

Mother—Postpartum Care and Assessment

General Assessment Pearls

- Monitor for signs of postpartum hemorrhage and shock.
- If pre-eclamptic, assess blood pressure every hour.
- **NCLEX** It is considered normal to have slight fever (100.4°F) for first 24 hours postpartum; temp >101.4°F indicates infection.
- Urinary retention is likely to occur postpartum; encourage fluids and monitor intake and output for first 12 hours.
- Encourage early ambulation; instruct Pt to change position slowly, because postural hypotension is common postpartum.

Breasts and Breastfeeding

- Colostrum appears within 12 hours, and milk appears in ~72 hours postpartum. Breasts become engorged by postpartum day 3 or 4 and should subside spontaneously within 24–36 hours.
- Assess breasts for infection and assess nipples for irritation.
- Encourage use of bra between feedings.

Complications:

- **Pain:** Assess for mastitis, abscess, milk plug, thrush, etc. Proper positioning of infant (football carry) will minimize soreness. Breast shields are used to prevent clothing from rubbing on nipples.
- **Engorgement:** Apply moist heat for 5 minutes before breastfeeding. Use ice compress after each feeding to reduce swelling and discomfort. Avoid bottles and pacifiers while breasts engorged, because may cause nipple confusion or preference.
- **NCLEX Mastitis:** Encourage rest and continuation of feeding or pumping. Administer prescribed antibiotics. **Note:** Breast milk is not infected and will not harm infant.

Abdomen and Uterus

- The uterus should be firm, about the size of a grapefruit, centrally located, and at the level of the umbilicus immediately postpartum.
- Deviation to the right may indicate distended bladder.
- If post-void uterus is still boggy, massage top of fundus with fingers held together and reassess every 15 minutes.

- Assess for bladder fullness (full bladder may inhibit uterine contractions and cause uterine bleeding). Have mother void if bladder is full.
- Mother and/or partner may be instructed to massage fundus.
- Auscultate bowel sounds and inquire daily about BMs.
- Constipation is common from anesthesia and analgesics as well as fear of perineal pain.
- Increased fiber and fluid intake, along with early and routine ambulation, will help to reduce occurrence of constipation.

Involution of the Uterus

- Immediately after delivery and within a few hours, the uterus should rise to the level of the umbilicus and remain there for the first 24 hours.
- After this, it descends ~1 cm/day while descending into the pelvic cavity.
- By day 10, it should no longer be palpable in the abdominal cavity.

Perineum

- **NCLEX** **Episiotomy:** Assess for swelling, bleeding, and infection.
- **Hemorrhoids:** Encourage sitz baths to help reduce discomfort.
- **Lochia:** Amount, character, and color. Explain stages and duration of lochial discharge and instruct Pt to report any odor.
 - **Lochia rubra:** 1–3 days postpartum, mostly blood and clots.
 - **Lochia serosa:** 4–10 days postpartum, serosanguineous.
 - **Lochia alba:** 11–21 days postpartum, creamy white, scant flow.

Lower Extremities

- **NCLEX** **Thrombophlebitis:** Unilateral swelling, decreased pulses, redness, heat, tenderness, and positive Homans' sign (calf pain or tenderness on dorsiflexion of foot). Leg exercises and early ambulation help minimize occurrence of venous stasis and clot formation.

Emotional Status

- Explain to mother and to her family that her emotions may shift from high to low and that these changes are considered a normal result of the tremendous hormonal changes occurring postpartum.
- **NCLEX** Assess parent-infant bonding and family support system.

The Pediatric Patient

Normal Pediatric Vital Signs

Age	RR	HR	SBP	Temp (°C)
Preterm	50–70	140–180	40–60	36.8–37.5
Newborn	30–60	110–120	60–90	36.8–37.5
6 months	25–35	110–180	85–105	37.5
1 year	20–30	80–160	95–105	37.5
2 years	20–30	80–130	95–105	37.5
4 years	20–30	80–120	95–110	37.5
6 years	18–24	75–115	95–110	37
8 years	18–22	70–110	95–115	37
10 years	16–20	70–110	95–120	37
12 years	16–20	60–110	95–125	37
Teenager	12–20	60–100	95–135	37

Average Height and Weight (50th Percentile)

Age	Height		Weight	
	(in)	(cm)	(lb)	(kg)
Newborn	18	45.7	8	3.6
6 months	26	66	16	7.2
1 year	30	76.2	21	9.5
2 years	34	86.4	27	12.2
4 years	40	101.6	35	16
6 years	45	114.3	45	20.5
8 years	50	127	56	25.5
10 years	55	139.7	73	33.2
12 years	60	152.4	92	41.8
Teenager	65	165.1	>110	>50

Pediatric Health History

Chief Complaint

- What prompted parents to bring child to hospital?
- What is child complaining of (pain, nausea, dyspnea)?

Focused Symptom Analysis

- **O:** Onset of symptoms
- **P:** Precipitating or palliative factors.
- **Q:** Quality/quantity; describe symptom(s). Are ADLs affected?
- **R:** Radiation/region/related symptoms.
- **S:** Severity; is symptom mild, moderate, or severe?
- **T:** Timing; frequency and duration.

Immunization History

- Are immunizations up to date? (see Childhood Immunization Schedule)
- Has child ever been diagnosed with a communicable disease?
- Has there been any recent exposure to a communicable disease?

Allergies

- Has child ever had allergic reaction to food, meds, etc.?
- What types of reactions occur with known allergies?

Medications

- Is child currently taking any medications? (Include OTC and prescription medications and herbal remedies.)
- What was time and dose of last medication taken?

Past Medical History

- Prior illnesses and injuries.
- Past or recent hospitalizations and surgical procedures.
- Overall health status since birth.

Events Surrounding Illness or Injury

- History and onset of current illness.
- History and mechanism of injury.

Current Intake and Output

- Document last oral intake. Has child been drinking and eating normally?
- Assess for malnutrition and dehydration.
- Does urine and stool output seem normal?

Pediatric Developmental Assessment

Age	Developmental Milestones
1 month	Cries to communicate, reflex activity, eye contact.
2 months	Coos, smiles, frowns, tracks objects, lifts head.
3 months	Turns from back to side, sits with support.
4 months	Turns from back to abdomen, lifts head, bears weight on forearms, can hold head erect, places everything in mouth, grasps with both hands, laughs.
5–6 months	Turns onto back, uses hands independently, plays with toes, puts feet into mouth, sits alone leaning forward on hands, holds bottle, extends arms to be picked up, stranger anxiety.
7–8 months	Begins to crawl, bears weight on feet when supported, pulls to a standing position, sits alone without any support, increased fear of strangers, walks alongside furniture, well-developed crawl.
9–10 months	May begin to walk and climb, one- to two-word vocabulary, understands “No,” shakes head to indicate “No,” follows simple directions.
12 months	Walks alone or with assistance, falls frequently while walking, points with one finger
15–18 months	Walks independently, throws overhanded, pulls/pushes toys, builds with blocks, runs clumsily, jumps in place on both feet, 8- to 10-word vocabulary.
2 years	Runs well, climbs stairs, bladder and bowel (potty) trained, names objects, two- to three-word phrases.
3–4 years	Rides tricycle, turns doorknobs, dresses self, uses short sentences, hops on one foot, can catch a ball.
6–12 years	Physically coordinated, uses complete sentences, has extensive vocabulary, swims, skates, rides bicycle, uses complex sentences, reads, forms social groups.

Common Childhood Illnesses

Croup

- **S/S:** Gradual onset, usually at night (fall and winter), **low-grade fever**, harsh, **“barking seal”** cough, hoarse voice. May have sore throat or chest discomfort from coughing.
- **Avoid examining airway.** Administer cool, nebulized mist, racemic epinephrine, IV fluids, and steroids.

Epiglottitis

- **S/S:** Rapid onset, **high-grade fever, inspiratory stridor**, muffled voice, difficulty breathing, upright, leaning forward, difficult and painful swallowing, excessive drooling.
- **Do not examine airway!** Oxygen, minimize agitation, ventilate with BVM or intubate if airway obstructs.

Measles (Rubella)

- **S/S:** Koplik's spots (small red spots with bluish-white centers). Progresses to red, blotchy rash along hairline and behind ears, rapidly spreads to chest and back and then thighs and feet.
- Supportive care, strict standard and airborne precautions.

Chicken Pox (Varicella)

- **S/S:** Red pimple-like spots. Starts on trunk then spreads to body. Pimples progress to red, teardrop blisters, eventually break open and scab over.
- Supportive care, standard precautions.

Respiratory Syncytial Virus (RSV)

- **S/S Child <3 yo:** High fever, severe cough, tachypnea, expiratory wheezes, and orthopnea.
- **S/S Child >3 yo:** Congestion, runny nose, cough, sore throat, low-grade fever, HA, and general malaise.
- Supportive care, bronchodilators for relieving bronchospasm.

Meningitis

- **S/S:** Stiff neck; headache; high fever, vomiting; confusion; drowsiness; lethargy; seizures; rash near axilla, hands, and feet, small hemorrhages under skin (petechiae).
- Supportive care, strict standard precautions.

Gastroenteritis

- **S/S:** Abdominal cramping, bloating, diarrhea (may be bloody and contain mucus), n/v, fever and dehydration.
- Supportive care, IV fluids and antiemetics as ordered.

Pediatric Assessment Pearls

- Begin by obtaining history from child's parent(s) and work toward physical assessment. Use this time to establish trust.
- Have parent hold child as much as possible during assessment.
- Approach child at his or her eye level and use first name frequently.
- Use simple language appropriate for child's developmental level.
- Begin assessment with diversion such as toy or game.
- Demonstrate procedures on doll whenever possible.
- Always tell the truth, especially when it comes to painful procedures.
- Perform invasive or uncomfortable assessments at end of assessment.
- Be friendly, but assertive. Do not give child choice when there is none (e.g., "I'm going to look in your mouth" versus, "May I look in your mouth?").

Recognizing Respiratory Distress in Pediatrics

Clinical Signs

- Anxiety and/or restlessness.
- Increased respiratory and heart rate.
- Cyanosis (circumoral, mucous membranes, nailbeds).
- Cool, moist skin.
- Nasal flaring, chest wall and sternal retractions.
- Abnormal respiratory sounds.
 - **Grunting:** Often in response to pain, may be associated with pulmonary edema.
 - **Stridor:** Involves **upper airway**. Associated with epiglottitis or laryngospasm.
 - **Wheezing:** Involves **lower airway**. Associated with asthma (bilateral) or aspiration of foreign body if unilateral.

Pain Assessment and Intervention

Signs and Symptoms by Developmental Stage

- **Infant:** Grimacing, frowning, startled expression, flinching, high-pitched, harsh cry, generalized, total-body response, extremities may thrash about, tremors, increased HR and BP, ↓ oxygen saturation.
- **Toddler:** Guarding, may touch or rub area, generalized restlessness, loud cry, increased HR and BP, may verbalize such as “owie” or “boo-boo.”
- **Preschooler:** May perceive pain as punishment, may deny pain to avoid treatment, may be able to describe location and intensity, may exhibit crying and kicking, or may be withdrawn.
- **School-aged:** Fear of bodily harm and mutilation, awareness of death, able to describe pain, may exhibit stiff body posture, may withdraw, and may attempt to delay procedures.
- **Adolescent:** Perceives pain at physical, emotional, and mental levels, is able to describe pain, may exhibit increased muscle tension, may be withdrawn, and may show decreased motor activity.

Interventions for Pain

Nonopioid Analgesics

- **Acetaminophen (Tylenol):** 10–15 mg/kg PO q4h, max five doses/day.
- **Ibuprofen (Advil):** (>2 years) 7.5 mg/kg PO qid, max 30 mg/kg/day.
- **Naproxen (Naprosyn):** (>2 years) 5 mg/kg PO bid, max two doses.

Opioid Analgesics

- **Codeine:** (>1 year) 0.5 mg/kg PO, IM, SC q4–6h, max four doses/day. Not recommended for IV use. Infants may get SC or IM codeine (same dose).
- **Meperidine (Demerol):** 1.1–1.8 mg/kg PO, IM, SC q3–4h prn, max 50–100 mg/dose.
- **Morphine:** 0.1–0.2 mg/kg IV, IM, or SC prn, max 15 mg/dose.
- **Sublimaze (Fentanyl):** (>2 years) 2–3 mcg/kg IV.

Nonpharmacological Interventions

- **Distraction:** Music, TV, games, dolls, stuffed animals, art, etc.
- **Minimize environmental stimuli:** Noises, bright lights, etc.
- **Provide comfort:** Positioning, rest, and relaxation.
- **Cutaneous stimulation:** Massage or heat or cold therapy.
- **Guided imagery:** Guide child to either a make-believe place or someplace he or she has visited in the past (i.e., Disneyland).

Pediatric IM Injection Sites

	Muscle*	Needle	Max Volume
Infant	NCLEX Vastus lateralis	5/8–7/8"	1 mL
Toddler	Ventrogluteal or vastus lateralis	5/8–1"	1 mL
Older child	Ventrogluteal or deltoid	5/8–1"	1 mL

*Dorsogluteal site is contraindicated in infants and children.

Recommended Childhood/Adolescent Immunization Schedule USA • 2009

	Birth	1 mon	2 mon	4 mon	6 mon	12 mon	15 mon	18 mon	19-23 mon	2-3 yr	4-6 yr	7-10 yr	11-12 yr	13-18 yr
HepB	HepB	HepB				HepB						HepB Series		
RV			RV	RV	RV									
DTaP			DTaP	DTaP	DTaP		DTaP				DTaP		Tdap	Tdap
Hib			Hib	Hib	Hib	Hib								
PCV			PCV	PCV	PCV	PCV				PPSV				
IPV			IPV	IPV		IPV				IPV		IPV Series		
Influenza										Influenza (Yearly)				
MMR						MMR					MMR		MMR	
VAR						VAR					VAR		VAR Series	
HepA						HepA (2 doses)					HepA Series			
MCV											MCV		MCV	MCV
HPV													HPV	HPV

Complete explanation and listing of immunizations at <http://www.cdc.gov/vaccines/recs/schedules/default.htm>

Range of Recommended Ages	Catch-up Immunizations	Certain High-Risk Groups
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The Geriatric Patient

General Guidelines

- Be mindful that elderly may be hard of hearing, but never assume that being elderly automatically makes it hard to hear.
- Approach and speak to elderly Pts as you would any other adult Pt. It is insulting to speak to the elderly like a child. Speaking slowly is sometimes necessary but does not indicate decreased intelligence.
- Eye contact helps instill confidence and, in the presence of impaired hearing, will help Pt to understand you better.
- Be aware that decreased tactile sensation and ROM are both normal changes with aging. Care should be taken to avoid unnecessary discomfort or even injury during assessment.
- Be aware of generational differences, especially gender differences (e.g., modesty for women, independence for men).
- Assess for altered mental states. Use your "3-D vision."
 - **Dementia:** Cognitive deficits.
 - **Delirium:** Confusion/excitement marked by disorientation to time and place, usually accompanied by delusions and/or hallucinations.
 - **Depression:** Diminished interest or pleasure in most or all activities.

Age-Related Changes and Implications

Change	Implication
NCLEX Decreased skin thickness	<ul style="list-style-type: none"> • Elderly Pts are more prone to skin breakdown. • Assess more frequently for pressure ulcers.
NCLEX Decreased skin vascularity	<ul style="list-style-type: none"> • Altered thermoregulation. • Increased risk for heat stroke.
Loss of subcutaneous tissue	<ul style="list-style-type: none"> • Decreased insulation. • Increased risk for hypothermia.
Decreased aortic elasticity	<ul style="list-style-type: none"> • Increased diastolic blood pressure.

Continued

Change	Implication
Calcification of thoracic wall	<ul style="list-style-type: none"> • Obscured heart and lung sounds. • Displacement of apical pulse.
Loss of nerve fibers/neurons	<ul style="list-style-type: none"> • Extra time needed to comprehend, learn, and to perform certain tasks.
NCLEX Decreased nerve conduction	<ul style="list-style-type: none"> • Response to pain is altered.
NCLEX Reduced tactile sensation	<ul style="list-style-type: none"> • Increased risk for injury to self.

Social Issues and Their Implications

Issue	Implication
Marital or companion status	<ul style="list-style-type: none"> • Pts living alone are less likely to access health care and are more likely to suffer from health problems, social isolation, and/or depression.
Living arrangements	<ul style="list-style-type: none"> • Ease of access to shopping and services. • Available support from family and friends.
Financial status	<ul style="list-style-type: none"> • Income level influences Pt's ability to access health care, especially prescription drugs.
Education	<ul style="list-style-type: none"> • Education level influences Pt's ability to understand and carry out instructions.
Caregiver responsibilities	<ul style="list-style-type: none"> • Pts with caregiving roles may be reluctant to report their own symptoms.
Caregiver availability	<ul style="list-style-type: none"> • Availability (or unavailability) of caregivers influences Pt's access to health care.
ADLs	<ul style="list-style-type: none"> • Pts of advanced age have more difficult time completing common, everyday ADLs.
Hobbies and interests	<ul style="list-style-type: none"> • Lack of hobbies or interests may lead to social isolation and depression.

Eating Problems in the Elderly

Possible Causes	Nursing Interventions
GI Disturbances <ul style="list-style-type: none"> • Difficulty swallowing. • Constipation. • Nausea and vomiting. • Gastric reflux (GERD). 	<ul style="list-style-type: none"> • Observe Pt for signs of swallowing difficulty (coughing while eating, holding food in mouth, frequent attempts to clear throat); consult with speech therapy. • Monitor bowel patterns; any trouble passing stool; assess for impaction. • Investigate cause of nausea and vomiting and assess for s/s of GERD.
Oral Problems <ul style="list-style-type: none"> • Missing or poorly fitting dentures. • Missing teeth, dental cavities, gum disease. • Dry mouth. 	<ul style="list-style-type: none"> • Inspect dentures for proper fit, use dental adhesive, and consider dental consult. • Provide oral care before and after meals. • Offer fluids frequently while eating to provide sufficient moisture to foods.
Functional Deficits <ul style="list-style-type: none"> • Weakness; inability to feed self; tremors. • Difficulty sitting upright, confined to bed. • Poor vision, less discriminating taste buds, and other sensory deficits. 	<ul style="list-style-type: none"> • Suggest consult with occupational therapist for assistive devices. • If Pt needs to be fed, offer small spoonfuls and allow ample time for chewing/swallowing. • Ensure Pt is in upright position for eating. • Use all assistive devices including glasses, hearing aids, and special, handled utensils.
Neurological Issues <ul style="list-style-type: none"> • Depression. • Anxiety. • Pain. • Dementia. 	<ul style="list-style-type: none"> • Work with health-care team to effectively manage pain, anxiety, and/or depression. • Provide consistent staff members to feed Pt; have family member present at mealtimes, if possible.
Medication Side Effects <ul style="list-style-type: none"> • Anorexia. • Nausea, vomiting. • Taste changes. • Constipation. • Drowsiness. 	<ul style="list-style-type: none"> • Evaluate medications for possible source. • Work with health-care team to change or discontinue drugs, if possible. • Treat side effects if medications cannot be changed (e.g., antiemetics). • Evaluate effects of interventions.

Dehydration in the Elderly

Dehydration is more common in older adults and can lead to confusion, urinary and respiratory tract infections, constipation, stroke, and death.

Common Risk Factors

- Diminished feelings of thirst.
- Decreased total body water (TBW).
 - Older adults, TBW represents 60% of weight.
 - Younger adults, TBW represents 70% of weight.

High-Risk Factors for Dehydration

- | | |
|--|---|
| • Age >85 years. | • Confinement to bed. |
| • Nursing home resident. | • Polypharmacy. |
| • Recent weight loss >5% of body weight. | • Limited opportunity to drink. |
| • Difficulties with feeding and eating, difficulty swallowing. | • Fever, vomiting, diarrhea. |
| • Dementia. | • Diuretic or laxative use. |
| • Multiple chronic conditions. | • Self-restriction of fluids related to incontinence or increased frequency of nighttime voiding. |

Signs and Symptoms

- Confusion, change in LOC, dizziness.
- Tachycardia, orthostatic hypotension.
- Low urine output, dark yellow to brownish urine.
- Dry skin, poor skin turgor, dry mucous membranes.
- Constipation, fecal impaction.
- Infection, elevated temperature.
- Weakness, fatigue.
- Signs of electrolyte imbalance.
- Increased urine specific gravity.
- Increased hematocrit.

Nursing Interventions

- Evaluate hydration status by assessing.
- Calculate desired fluid intake per day:

Start with Pt's weight (kg)	Example: Pt weighs 70 kg
• Subtract 20	= 50
• Multiply by 15	= 750
• Add 1500	= 2250
• Multiply by 0.75	= 1688 mL/day

- Provide 80% of desired fluid goal at meals (1350 mL for 70-kg Pt).
- Provide remaining 20% between meals (338 mL for 70-kg Pt).
- Offer a variety of fluids and have Pt take sips throughout day if he or she has trouble taking more at a time.
- Document intake and output, difficulties drinking.
- Assess weight daily and record.
- Note urine specific gravity and urine color.
- Post volume of each container (cups, bowls, tea cup, etc.) in Pt's room.
- For test preparation (NPO or bowel cleansing), arrange timing so that test occurs as soon as possible. Offer fluids immediately after test is completed unless contraindicated. Consider IV hydration if NPO status is prolonged.
- Notify physician or nurse practitioner immediately if signs or symptoms of dehydration are present. Dehydration can progress quickly and become severe, and is associated with a high mortality rate in elderly Pts.

Depression and Suicide in the Elderly

Depression is quite common in older adults, is often unreported and unrecognized, diminishes quality of life, and can lead to suicide.

Signs and Symptoms of Depression

Physical

- Aches, pains, stomach problems.
- Changes in appetite.
- Insomnia or excessive sleeping.
- Feeling tired all the time.

Emotional

- Unrelenting feeling of sadness.
- Apathy and diminished pleasure.
- Crying for no apparent reason.
- Indifference to others.
- Feelings of hopelessness, helplessness, and worthlessness.

Cognitive

- Impaired concentration.
- Problems with memory.
- Indecisiveness.
- Recurrent thoughts of death and suicide.

Behavioral

- Neglecting personal appearance.
- Withdrawing from others.
- Increased alcohol consumption or use.
- Agitation/anxiety.

Signs of Suicidal Intent

- Talking about death as a relief.
- Giving away possessions.
- Failing to take medication.
- Obtaining a weapon.

Nursing Interventions

- Assess Pts for signs and symptoms of depression.
- If Pt is depressed, ask if he or she has thought about committing suicide.
- Show interest and offer support; elders may want to talk about their lives. Called life review, these talks can help older adults identify main themes of their lives, express regret, and talk about their legacy.
- Avoid giving pat answers or advice such as “you have a lot to live for” or avoiding conversation altogether.
- Identify Pt’s support among friends, family, clergy.
- Remove implements or medications that can be used for suicide.
- Notify other staff, document your findings, and participate in plan of care.

Differentiating Delirium and Dementia

Factor	Delirium	Dementia
Onset	Sudden	Gradual
Duration	Brief (hours–days).	Long (months–years).
LOC	Fluctuates throughout day.	Unaffected.
Motor	Tremor, myoclonus, ataxia, hyperactivity	None until late.
Speech	Incoherent.	Normal to aphasic in later stages.
Language	Vocabulary usual for Pt, but frequent use of wrong words.	Impoverished, worsens as disorder progresses.
Memory	Impaired.	Impaired.
Attention	Impaired, fluctuates.	Normal to easily distracted.
Perception	Hallucinations common.	Hallucinations uncommon.
Mood	Fearful, suspicious, irritable.	Fearful, suspicious, irritable, normal affect, depressed early in disorder.
Sleep	Disturbances common.	Disturbances common.
General condition	Pts look sick.	Pts look healthy.
Clinical course	Fluctuates over short term.	Stable over short term.

Pharmacokinetics in the Elderly

Definition: Pharmacokinetics is the way the body absorbs, distributes, metabolizes, and excretes medication. Age-related physiological changes affect body systems, alter pharmacokinetics, and increase or alter a drug's effect.

	Physiological Change	Effect on Pharmacokinetics
Absorption	<ul style="list-style-type: none"> • Decreased intestinal motility. • Diminished blood flow to gut. 	<ul style="list-style-type: none"> • Delayed peak effect. • Delayed signs and symptoms of toxicity.
Distribution	• Decreased fluid volume.	• Increased serum concentration of water-soluble drugs.
	• Increased body fat percentage.	• Increased half-life of fat-soluble drugs.
	• Decreased plasma proteins.	• Increased half-life of fat-soluble drugs.
	• Decreased lean body mass.	• Increased amount of active drug.
Metabolism	• Decreased blood flow to liver.	• Increased drug concentration.
	• Decreased liver function.	• Decreased rate of drug clearance by liver.
Excretion	<ul style="list-style-type: none"> • Decreased kidney function. • Decreased creatinine clearance. 	<ul style="list-style-type: none"> • Increased accumulation of some drugs. • Increased accumulation of drugs that are normally excreted by kidneys.

Definition: Polypharmacy is concurrent use of several drugs. Taking two drugs increases risk of an adverse drug event by 6%; taking eight drugs increases risk by 100%.

Polypharmacy Assessment and Prevention

- Have pharmacy and physician regularly review medications.
- Take complete medication history, including OTC and herbal supplements.
- Evaluate all medications for correct dose, duplication, and potential for drug-drug interactions.
- Look up contraindications and drug-drug interactions of medications.
- Coordinate care if multiple physicians are caring for Pt.
- Educate Pt and family about medication use.
- Encourage Pts to use one pharmacy for all their prescriptions.
- Help Pts develop a simple medication regimen.
- Ensure that all pill bottles are easy to read and labeled correctly.
- Encourage nonpharmacological treatments whenever possible.

Fall Risk Assessment and Prevention

Risk Factor	Intervention
Assessment Data <ul style="list-style-type: none"> • Age >65 years. • History of falls. 	<ul style="list-style-type: none"> • Monitor frequently. • Pt should be close to nurses' station. • Implement fall prevention interventions.
Medications <ul style="list-style-type: none"> • Polypharmacy. • CNS depressants. • BP/HR lowering. • Diuretics and meds that affect GI motility. 	<ul style="list-style-type: none"> • Review medications with physician. • Assess for medications that may affect blood pressure, heart rate, balance, or LOC. • Educate about use of sedatives, narcotics, and vasoactive medications. • Encourage nonopioid pain management.

Continued

Risk Factor	Intervention
Mental Status • Altered LOC or orientation.	• Routinely reorient Pt to situation. • Maintain safe and structured environment. • Utilize pressure-sensitive alarms in bed and chairs.
Cardiovascular • Postural hypotension.	• Change positions slowly. • Review med record for possible changes.
Neurosensory • Visual impairment. • Peripheral neuropathy. • Difficulty with balance or gait.	• Provide illumination at night. • Minimize clutter and remove unnecessary or infrequently used equipment from room. • Provide protective footwear. • Provide appropriate assistive devices and instruct on proper use.
GI/GU • Incontinence. • Urinary frequency. • Diarrhea.	• Ensure call light is within easy reach. • Create toileting schedule. • Provide bedside commode or urinal. • Unobstructed, well-lit path to bathroom.
Musculoskeletal • Decreased ROM. • Amputee.	• Provide ROM exercises and stretching. • PT or OT consult. • Provide appropriate assistive devices.
Assistive Devices • Use of cane, walker, or WC.	• Ensure that assistive devices are not damaged and are appropriately sized. • Instruct Pt on proper and safe use.
Environment • Cluttered room. • Tubes and lines.	• Minimize clutter. Remove unnecessary or infrequently used equipment. • Ensure call light is within easy reach.

Adult Immunization Schedule by Vaccine and Age Group USA • 2009

	19–26 yrs	27–49 yrs	50–59 yrs	60–64 yrs	≥65 yrs
Td/Tdap (tetanus, diphtheria, pertussis)	Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yr				Td booster every 10 yr
HPV (human papillomavirus)	3 doses	◀ (females)			
Varicella	2 doses				
Zoster				1 dose	
MMR (measles, mumps, rubella)	1 or 2 doses			1 dose	
Influenza	1 dose annually		1 dose annually		
Pneumococcal (polysaccharide)	1 or 2 doses				1 dose
Hepatitis A	2 doses				
Hepatitis B	3 doses				
Meningococcal	1 or more doses				
Complete explanation and listing of immunizations at http://www.cdc.gov/vaccines/recs/schedules/default.htm					
Recommended immunization schedule by age group or lack of documentation		Recommended if some other indication is present (e.g., occupation, lifestyle, etc.)			

Source: Centers for Disease Control and Prevention, 2009.

Patient Education Resources

American Cancer Society: http://www.cancer.org
American Academy of Ophthalmology: http://www.aao.org/aao/
American Heart Association: http://www.americanheart.org
American Dental Association: http://www.ada.org
American Diabetes Association: http://www.diabetes.org
American Dietetic Association: http://www.eatright.org
American Lung Association: http://www.lungusa.org
Centers for Disease Control and Prevention: http://www.cdc.gov/
Department of Health and Human Services: http://www.healthierus.gov
Healthy People: http://www.healthypeople.gov
National Cancer Institute: http://www.cancer.gov/
National Center for Complementary and Alternative Medicine: http://nccam.nih.gov/
National Eye Institute: http://www.nei.nih.gov/
National Heart Lung and Blood Institute: http://www.nhlbi.nih.gov/
National Human Genome Research Institute: http://www.genome.gov/
National Institute of Allergy and Infectious Diseases: http://www3.niaid.nih.gov/
National Institute of Arthritis and Musculoskeletal and Skin Diseases: http://www.niams.nih.gov/
National Institute of Child Health and Human Development: http://www.nichd.nih.gov/
National Institute of Dental and Craniofacial Research: http://www.nidcr.nih.gov/
National Institute of Diabetes and Digestive and Kidney Diseases: http://www2.niddk.nih.gov/
National Institute of Environmental Health Sciences: http://www.niehs.nih.gov/
National Institute of Health: http://www.health.nih.gov
National Institute of Mental Health: http://www.nimh.nih.gov/

National Institute of Neurological Disorders and Stroke: http://www.ninds.nih.gov/
National Institute of Nursing Research: http://www.ninr.nih.gov/
National Institute on Aging: http://www.nia.nih.gov/
National Institute on Alcohol Abuse and Alcoholism: http://www.niaaa.nih.gov/
National Institute on Deafness and Other Communication Disorders: http://www.nidcd.nih.gov/
National Institute on Drug Abuse: http://www.nida.nih.gov/
National Library of Medicine: http://www.nlm.nih.gov/
National Mental Health Association: http://www.nmha.org
United States Department of Agriculture: http://www.usda.gov

Exercise and Nutrition Education

General Principles and Guidelines

- BMI of 25–30 kg/m² = overweight; BMI >30 kg/m² = obese.
- 1 lb of body fat = 3500 cal.
- The recommended rate of weight loss is 1–2 lb/week.
- Most effective way to manage weight is through combination of diet, exercise, and behavior modification.
- Too many calories from any source of carbohydrates, fat, and/or protein promote weight gain.
- Serving sizes of all foods should be managed.
- Food pyramid can be used as guide to healthy eating.
- Exercise burns calories and assists in weight management.
- Attempt to complete 30–60 minutes of exercise each day.
- Watch less TV and play fewer video games.
- Fat is most concentrated source of calories, and excessive amount is a contributing factor of weight gain. Limit fat (9 cal/gram) intake to 25%–30% of total calories/day.
- Keeping a food diary enhances successful weight management, and keeping a weekly graph of weight change is recommended.
- Limit fast food to only those establishments that offer low-calorie menu options.

- Keep food safe to eat (store foods at proper temperature and check expiration dates often).
- Choose a diet low in saturated fat and cholesterol.
- Choose and prepare foods with less salt.
- Choose a variety of grains daily, especially whole grains.
- Choose a variety of fruits and vegetables daily.
- Consume 6–8 cups (48–64 oz) of water daily.
- Choose beverages and foods that limit your intake of sugar and caffeine.
- If you drink alcoholic beverages, do so in moderation.

Sources: Heska, S, et al: Weight loss with self-help compare with a structured commercial program: a randomized trial. *JAMA*. 2003; 289: 14, 2003; and Lutz, C, and Przytulski, K: *Nutri Notes: Nutrition and Diet Therapy Pocket Guide*. Philadelphia: FA Davis; 2004.

Food Sources for Specific Nutrients

Calcium-Rich Foods

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> • Bok choy • Broccoli • Canned fish • Creamed soups | <ul style="list-style-type: none"> • Clams • Dairy • Molasses • Oysters | <ul style="list-style-type: none"> • Refried beans • Spinach • Tofu • Turnip greens |
|--|---|---|

Iron-Rich Foods

- | | | |
|--|---|--|
| <ul style="list-style-type: none"> • Cereals • Clams • Dried beans/peas | <ul style="list-style-type: none"> • Dried fruit • Leafy green vegetables | <ul style="list-style-type: none"> • Lean red meat • Molasses • Organ meats |
|--|---|--|

Potassium-Rich Foods

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> • Apricots • Avocados • Bananas • Broccoli • Cantaloupe • Dried fruit • Grapefruit • Honey dew | <ul style="list-style-type: none"> • Kiwi • Lima beans • Meats • Dried beans and peas • Nuts • Oranges • Peaches | <ul style="list-style-type: none"> • Plantains • Potatoes • Rhubarb • Spinach • Sunflower seeds • Tomatoes • Winter squash |
|---|---|---|

Sodium-Rich Foods		
<ul style="list-style-type: none"> • Salt • Fast food • Canned foods • Mac and cheese • Canned sauces 	<ul style="list-style-type: none"> • Butter • Margarine • Buttermilk • Baking mixes • BBQ sauce 	<ul style="list-style-type: none"> • Salad dressing • Cured meats • Chips • Potato salad • Ketchup
Low-Sodium Foods		
<ul style="list-style-type: none"> • Baked poultry • Canned pumpkin • Cooked turnips • Egg yolk • Fresh vegetables • Fruit 	<ul style="list-style-type: none"> • Grits • Honey • Jams, jellies • Lean meats • Low-cal mayo • Macaroons 	<ul style="list-style-type: none"> • Potatoes • Puffed wheat • Puffed rice • Lima beans • Sherbet • Unsalted nuts
Vitamin D-Rich Foods		
<ul style="list-style-type: none"> • Canned salmon • Canned sardines • Canned tuna 	<ul style="list-style-type: none"> • Fish • Fish liver oils • Cereals 	<ul style="list-style-type: none"> • Fortified milk • Nonfat dry milk
Vitamin K-Rich Foods		
<ul style="list-style-type: none"> • Asparagus • Beans • Broccoli • Brussels sprouts • Mustard greens 	<ul style="list-style-type: none"> • Cauliflower • Collards • Green tea • Kale • Milk 	<ul style="list-style-type: none"> • Cabbage • Spinach • Swiss chard • Turnips • Yogurt
Foods Containing Tyramine		
<ul style="list-style-type: none"> • Aged, processed cheeses • Avocado • Bananas • Bean curd • Beer and ale • Caffeinated beverages • Caviar • Chocolate • Distilled spirits 	<ul style="list-style-type: none"> • Sausage • Liver • Tenderized meat • Miso soup • Overripe fruit • Peanuts • Raisins • Raspberries • Red wine • Sauerkraut 	<ul style="list-style-type: none"> • Sherry • Shrimp paste • Smoked or pickled fish • Soy sauce • Vermouth • Yeasts • Yogurts

Continued

Foods That Acidify Urine

<ul style="list-style-type: none"> • Cheese • Corn • Cranberries • Eggs • Fish 	<ul style="list-style-type: none"> • Grains • Lentils • Meats • Nuts (walnuts, Brazil, filberts) 	<ul style="list-style-type: none"> • Pasta • Plums • Poultry • Prunes • Rice
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Foods That Alkalize Urine

<ul style="list-style-type: none"> • All fruits except cranberries, prunes, plums 	<ul style="list-style-type: none"> • All vegetables except corn • Milk 	<ul style="list-style-type: none"> • Almonds • Chestnuts
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Food Pyramid

Go to <http://www.mypyramid.gov> for complete Food Pyramid information.

Food Pyramid Modifications

Vegetarians

- Subtract meats, poultry, eggs, and fish.
- Add legumes, nuts, and seeds: Two to three servings every day.

Pts >70 Years

- Fats, oils, and sweets: Use sparingly.
- Dairy: Three servings every day.
- Meat, legumes, and nuts: Two servings every day.
- Vegetables: At least three servings every day.
- Fruit: Two servings every day.
- Bread, cereal, rice, and pasta: Six servings every day.
- Water: Eight servings every day.
- Supplements: Calcium, vitamin D, and vitamin B₁₂.

Foods to Avoid With Certain Drugs/Herbs

Drug/Herb	Avoid or Moderate
ACE inhibitors	Potassium-containing salt substitute
Ampicillin	Carbonated beverages, acidic juices
Aspirin	Feverfew, ginkgo, green tea
Barbiturates	Valerian
Calcium-channel blockers	Grapefruit juice
Cloxacillin	Carbonated beverages, acidic juices
Cyclosporine	Grapefruit juice, potassium-containing salt substitute
Digoxin	High-fiber foods and meals
Enteric-coated pills	Excess milk, hot beverages, alcohol
Fluoroquinolones	Foods high in calcium, iron, or zinc (dairy and red meat)
Hemorrhoid medications	Saw palmetto
Indomethacin	Potassium-containing salt substitute
Isoniazid	High-carbohydrate foods
Levodopa	Excess protein
Lithium	Significant increase or decrease in sodium intake
MAO inhibitors	Foods containing tyramine
Methyldopa	Excess protein
NSAIDs	Asian ginseng, ginkgo
Penicillin G	Carbonated beverages, acidic juices
Phenytoin	Excess protein
Potassium-sparing diuretics	Potassium-containing salt substitute
"Statin" drugs	Grapefruit and grapefruit juice
Tetracycline	Iron-rich food or supplements, calcium
Theophylline	Excess protein
Warfarin (Coumadin)	Vitamin K-rich foods and supplements, Asian ginseng, feverfew, garlic, ginger, ginkgo, St. John's wort, green tea
Zidovudine	Excess fat

Common Herb-Rx Drug Interactions

Herb	Known Drug Interaction
Aloe	Increases risks associated with cardiac glycosides.
Anise	May interfere with anticoagulants, MAO inhibitors (MAOIs), and hormone therapy.
Brewer's yeast	MAOIs can cause an increase in BP.
Echinacea	May possibly interfere with immunosuppressant agents.
Eucalyptus	Induction of liver enzymes, which may increase the metabolism of other drugs.
Feverfew Garlic Ginger Ginkgo	May inhibit platelet activity (avoid use with warfarin or other anticoagulants). May potentiate effects of MAOIs (ginkgo).
Ginseng	May potentiate effects of caffeine. May interfere with phenelzine. May inhibit platelet activity (avoid use with warfarin or other anticoagulants).
Goldenseal	May interfere with antacids, sucralfate, H ₂ antagonists, antihypertensive agents, and anticoagulants.
Hawthorne	May inhibit metabolism of ACE inhibitors and potentiate effect of cardiac glycosides.
Kava-kava	May potentiate or have additive effects of CNS depressants, antiplatelets, and MAOIs.
Ma-huang	Potentiate sympathomimetic effects of antihypertensives, antidepressants, MAOIs.
Oak bark	Inhibits absorption of alkaloids and other alkaline drugs.
Peppermint	May interfere with gastric acid-blocking drugs.
Psyllium	Interferes with absorption of other drugs.
St. John's wort	May increase risk of adverse reactions of antidepressants. May significantly reduce blood concentrations of indinavir.
Saw palmetto	May interfere with oral contraceptives and hormone therapy.
Valerian	May potentiate sedative effects.

Suggested Dietary Changes Related to Diseases

Disease Process	Suggested Dietary Modification
Celiac sprue	Avoid gluten-containing foods.
Cholelithiasis	Avoid fatty foods.
Cirrhosis	Limit sodium; limit protein intake; avoid alcohol.
Congestive heart failure	Limit sodium.
Coronary artery disease	American Heart Association diets.
Diabetes mellitus	American Diabetic Association diet; limit calories; exercise.
Diverticulosis	Low-residue diet.
Dysphagia	Special consistency diets as indicated by testing/tolerance.
Esophagitis	Avoid alcohol, nonsteroidal drugs, tobacco; consume thick liquids.
Gastroesophageal reflux	Avoid caffeine, chocolates, mints, or late meals.
Gout	Limit alcohol, purine, and citric acid intake.
Hyperhomocysteinemia	Increase consumption of folates, vitamin B ₁₂ .
Hyperlipidemias	National Cholesterol Education Program diet with limited fat and cholesterol and increased fiber.
Iron-deficiency anemia	Iron supplements with vitamin C.
Irritable bowel syndrome	Increase fiber content of meals; limit dairy products.
Kidney stone formers	Liberal fluid intake.
Nephrotic syndrome	Limit sodium intake.
Obesity	Restrict calories, increase exercise.
Osteoporosis	Supplement calcium and vitamin D; limit alcohol and tobacco.
Pernicious anemia	Supplement cyanocobalamin (vitamin B ₁₂).
Renal failure	Limit sodium, potassium, protein, and fluids.
Women and men, >25 years of age	Supplement calcium: 1000 mg/day (1200 mg/day if >50 years old).

Diseases and Disorders

Alzheimer's Disease (AD)

Definition: A disabling degenerative disease of the nervous system characterized by dementia and failure of memory for recent events, followed by total incapacitation and eventually death.

Clinical Findings

Stage I: Loss of recent memory, irritability, loss of interest in life, and decline of abstract thinking and problem-solving ability.

Stage II: (Most common stage when disease is diagnosed) profound memory deficits, inability to concentrate or manage business or personal affairs.

Stage III: Aphasia, inability to recognize or use objects, involuntary emotional outbursts, and incontinence.

Stage IV: Pts become nonverbal and completely withdrawn. Loss of appetite leads to a state of emaciation. All body functions cease, and death quickly ensues.

Nursing Focus

- Monitor vital signs and LOC, and implement collaborative care as ordered.
- Keep requests simple and avoid confrontation.
- Maintain a consistent environment and frequently reorient Pt.

Patient Teaching

- Provide Pt and family with literature on AD.
- Advise family that as AD progresses, so does need for supervision of ADLs such as cooking and bathing.
- Advise family to lock windows and doors to prevent wandering.
- Explain that Pt should wear an ID bracelet in case he or she becomes lost.
- Explain actions, dosages, side effects, and adverse reactions of meds.

Asthma

Definition: Often referred to as *reactive airway disease* (RAD), asthma is an intermittent, reversible, obstructive lung disease characterized by bronchospasm and hyperreactivity to a multitude of triggering agents (allergens/antigens/irritants).

Clinical Findings: Difficulty breathing, wheezing, cough (either dry or productive of thick, white sputum), chest tightness, anxiety, and prolonged expiratory phase, use of accessory muscles.

Nursing Focus

- During an attack, assess and maintain ABCs, notify RT/MD, and implement collaborative care such as meds and IV fluid as ordered.
- Stay with Pt and offer emotional support.
- Monitor vital signs and document response to prescribed therapies.

Patient Teaching

- Provide Pt and family with literature on asthma.
- Explain actions, dosages, side effects, and adverse reactions of meds.
- Provide instructions on proper use of metered-dose inhalers.
- Provide instructions on proper use of peak-flow meter.
- Provide instructions on implementing an asthma management plan.
- Teach Pt and family about kinds of triggering agents that can precipitate an attack and how to minimize risk of exposure.
- Instruct Pt to seek immediate medical attention if symptoms are not relieved with prescribed meds.

Cancer: General Overview

Definition: Malignant neoplasia marked by uncontrolled growth of cells, often with invasion of healthy tissues locally or throughout the body (metastasis).

Clinical Findings: Vary with different types of cancer. For a general overview of symptoms suggestive of cancer, see **CAUTION: Seven Warning Signs of Cancer** later in this section.

Types of Treatments

- **Surgery:** Removing cancerous tissue surgically or by means of cryosurgery (technique for freezing and destroying abnormal cells).

- **Chemotherapy:** Treatment of cancer with drugs (“anticancer” drugs) that destroy cancer cells or stop them from growing or multiplying. Because some drugs work better together than alone, two or more drugs are often given concurrently (combination therapy).
- **Radiation Therapy:** Ionizing radiation (x-rays, gamma rays, or radioactive implants) deposits energy that injures or destroys cells in target tissue by damaging their genetic material and making continued growth impossible.
- **Palliative and Hospice Care:** Care focused solely on minimizing pain and suffering when cure is not an option.

Nursing Focus

- **Nausea/vomiting:** Administer antiemetics as needed and before chemotherapy is initiated. Withhold foods and fluids 4–6 hours before chemotherapy. Provide small portions of bland foods after each treatment.
- **Diarrhea:** Administer antidiarrheals. Monitor electrolytes. Give clear liquids as tolerated. Maintain good perineal care.
- **Stomatitis:** Avoid commercial mouth wash containing alcohol. Encourage good oral hygiene. Help Pt rinse with viscous lidocaine before eating to reduce discomfort and again after meals. Apply water-soluble lubricant to cracked lips. Popsicles provide a good source of moisture.
- **Itching:** Keep Pt’s skin free of foreign substances. Avoid soap: wash with plain water and pat dry. Use cornstarch or olive oil to relieve itching, and avoid talcum powder and powder with zinc oxide.

Patient Teaching

- Provide literature for specific type of cancer to Pt and family.
- Prepare Pt and family for what to expect with chemo and radiation therapy.
- If surgery is to be performed, provide preoperative teaching to prepare Pt and family for procedure and postoperative care. Provide discharge instructions.
- Explain actions, dosages, side effects, and adverse reactions of meds.

Tumor Facts



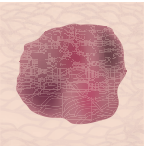
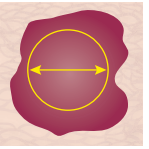
- **Benign tumors:** Noncancerous. They can often be removed, and, in most cases, do not come back. Cells from benign tumors do not spread to other parts of the body. Most importantly, benign tumors are rarely a threat to life.
- **Malignant tumors:** Cancerous. Cells in these tumors are abnormal and divide without control or order. They can invade and damage nearby tissues and organs.
- **Metastasis:** Process by which cancer cells break away from a malignant tumor and enter bloodstream or lymphatic system, thereby spreading from original cancer site to form new tumors in other organs.

TNM Staging of Cancer

T—Tumor Size	N—Nodes Involved	M—Metastasis
T1Small	N0No involvement	M0None
T2–T3Medium	N1–N3Moderate	M1 . . . Metastasis
T4Large	N4Extensive	

ABCDs of Melanoma

- **Asymmetry:** One side of lesion looks different from the other.
- **Border:** Edges irregular, ragged, notched, or blurred.
- **Color:** Color not uniform throughout lesion.
- **Diameter:** >6 mm or an increase in size.

Asymmetry	Border	Color	Diameter
			

NCLEX

Breast Self-Examination



1

2



3



Observe for symmetry, lumps, dimpling, nipple retraction, or failure of nipple erection

Feel for nodes, irregularity, and tenderness both in breasts and axillary areas



4

5



6



Gently squeeze nipple and observe for secretion, and nipple erection after each nipple is gently stimulated

While leaning forward, observe breasts as they are reflected in mirror to detect irregularity, retracted areas, nipple retraction especially on one side only

NCLEX

Testicular Self-Examination (TSE)

- Testicular Cancer Research Center recommends monthly TSE.
- Self-examination for testicular cancer is best performed after a warm bath or shower (heat relaxes the scrotum and makes it easier to spot anything abnormal).
- Stand in front of a mirror and check for any swelling on the scrotal skin.
- Examine each testicle with both hands. Place the index and middle fingers under the testicle with the thumbs placed on top.
- Roll the testicle gently between the thumbs and fingers. You should not feel any pain when doing the examination.
- It is normal for one testicle to be slightly larger than the other.

- Find the epididymis, the soft, tube-like structure behind the testicle that collects and carries sperm. If you are familiar with this structure, you will not mistake it for a suspicious lump.
- Cancerous lumps usually are found on the sides of the testicle but can also show up on the front.
- Lumps on the epididymis are not cancerous.



Common Types of Cancers

Breast Cancer NCLEX

Clinical Findings: Presence of palpable breast lump, inflammation of breast, dimpling, orange-peel appearance, distended vessels, and/or nipple changes or ulcerations.

Colorectal Cancer

Clinical Findings: Changes in bowel patterns such as constipation or diarrhea, bloody stools (may be bright red or tarry in appearance), abdominal cramping, nausea and vomiting, anorexia, feeling of fullness, and palpable abdominal masses.

Hodgkin's Disease (Lymphoma)

Clinical Findings: Painless swelling of lymph nodes of neck, axillae, and inguinal areas. Other symptoms include fatigue, fever and chills, night sweats, unexplained weight loss, anorexia, and pruritus.

Leukemia **NCLEX**

Clinical Findings: Fever, chills, persistent fatigue or weakness, frequent infections, anorexia, unexplained weight loss, swollen lymph nodes, enlarged liver or spleen, petechiae rash, night sweats, bone tenderness, abnormal bruising, and increased bleeding time.

Lung Cancer

Clinical Findings: Early-stage lung cancer is usually asymptomatic and is discovered from abnormal findings on routine chest x-ray. Advanced-stage lung cancer often manifests with persistent cough, chest pain, dyspnea, fatigue, weight loss, hemoptysis, and hoarseness.

Lymphoma

Hodgkin's disease, page 121; and Non-Hodgkin's Lymphoma, this page.

Non-Hodgkin's Lymphoma (NHL)

Clinical Findings: Fatigue, unexplained weight loss, pruritus, fever, and night sweats.

Ovarian Cancer

Clinical Findings: Abdominal distention and palpable masses, unexplained weight loss, pelvic pain and discomfort, urinary urgency, and constipation.

Prostate Cancer

Clinical Findings: Urinary frequency, nocturia, dysuria, and hematuria may be present. In advanced stages, Pts may complain of back pain and weight loss. Digital rectal examination reveals prostatic lesions, and laboratory tests show prostate-specific antigen (PSA) level >10 ng/mL (normal is <4 ng/mL).

Skin Cancer (Basal Cell and Squamous Cell)

Clinical Findings: A classic indication of skin cancer is a skin change, especially a new lesion with nonuniform shape and color or a sore that will not heal.

Skin Cancer (Melanoma)

Clinical Findings: A classic sign of melanoma is a change in color, shape, or size of an existing mole or nevus. Melanomas are usually dark blue to black.

Testicular Cancer

Clinical Findings: Earliest sign is small, hard, painless lump on testicle. Other symptoms include low back pain, feeling of heaviness in scrotum, gynecomastia, and breast tenderness. Depending on stage of cancer, there may be enlarged lymph nodes in surrounding areas.

Uterine Cancer

Clinical Findings: The most common symptom is abnormal, painless vaginal bleeding. Late symptoms include pain, fever, and bowel or bladder dysfunction. Palpation may reveal enlarged uterus and uterine masses. A mucosanguineous, odorous discharge may indicate vaginal metastasis.

Chronic Obstructive Pulmonary Disease (COPD)

Definition: A group of diseases that cause airflow blockage and breathing-related problems. COPD includes asthma, chronic bronchitis, and emphysema. COPD is a slowly progressive disease of airways that is characterized by gradual loss of lung function.

Clinical Findings: Cough productive of sputum, shortness of breath, wheezing, and chest tightness.

Three Types of COPD

- **Asthma:** See Asthma, page 117.
- **Chronic bronchitis:** Characterized by productive cough lasting >3 months during two consecutive years and airflow obstruction caused by excessive tracheobronchial mucus production.
- **Emphysema:** Characterized by abnormal, permanent enlargement of the distal air spaces past the terminal bronchioles, loss of elasticity, distal air space distention, and alveolar septal destruction.

Nursing Focus

- Position Pt to maximize ease of breathing (HOB 30°–45°).
- Teach “pursed-lipped” breathing to decrease air trapping.
- Stage activities to conserve energy and decrease oxygen demand.
- Encourage frequent small feedings of high-calorie foods/liquids to maximize calorie intake.
- During an exacerbation, assess and maintain ABCs, notify RT/MD, and implement collaborative care such as meds and IV fluid as ordered.
- Monitor vital signs and document response to prescribed therapies.

Patient Teaching

- Provide Pt and family with literature on specific type of COPD.
- Explain actions, dosages, side effects, and adverse reactions of meds.
- Provide instructions on proper use of metered-dose inhalers.
- Instruct Pt to seek immediate medical attention if symptoms are not relieved with prescribed meds.

Congestive Heart Failure (CHF)

Definition: Condition in which the heart is unable to pump sufficient blood to meet metabolic needs of the body. Result of inadequate cardiac output (CO) is poor organ perfusion and vascular congestion in pulmonary (left-sided failure) and systemic (right-sided failure) circulation.

Clinical Findings: Most common symptoms include fatigue, shortness of breath, and edema (vascular congestion in either the pulmonary or systemic circulation) in ankles or feet, in sacral area, or throughout body. Ascites may cause Pt to feel bloated and may compromise respiratory effort. Onset of symptoms may be rapid or gradual, depending on underlying etiology. **NCLEX** **Left-sided heart failure:** Orthopnea, pulmonary edema, crackles or wheezes, dysrhythmias, tachycardia, tachypnea, dyspnea, anxiety, cyanosis, HTN (early CHF), low BP (late CHF), and decreased CO. **NCLEX** **Right-sided heart failure:** Dependent edema, JVD, bounding pulses, oliguria, dysrhythmias, enlargement of the liver and/or spleen, increased CVP, and altered liver function tests.

Nursing Focus

- Encourage rest and help alleviate dyspnea by administering supplemental oxygen as ordered and elevating HOB 30°–45°.
- In end-stage CHF, slightest activity can cause fatigue and shortness of breath; therefore, assist Pt with ADLs and eating as needed. Stage activities to conserve energy and decrease oxygen demand.
- Restrict fluid intake (typically <2 L/day) and sodium intake as ordered (typically 1500–2300 mg/day depending on severity of heart failure).
- Assess vital signs before and after any level of increased activity.
- Monitor for signs and symptoms of fluid overload, impaired gas exchange, activity intolerance, daily intake and output, and weight gain will help in early detection of exacerbation.

Patient Teaching

- Provide Pt with literature on CHF.
- Teach Pt and family to monitor for increased shortness of breath or edema.
- Teach Pt to limit fluids to 2 L/day and restrict sodium as ordered.
- Teach Pt to weigh self at same time every day using same scale and report any weight gain >4 lb in 2 days.
- Instruct Pt to call for emergency assistance with acute shortness of breath or chest discomfort that is not relieved with rest.
- Review fluid and dietary restrictions, and stress importance of reducing sodium intake.
- Explain dosages, route, actions, and adverse reactions of meds.

Coronary Artery Disease (CAD)

Definition: Narrowing and hardening of arterial lumen resulting in decreased coronary blood flow and decreased delivery of oxygen and nutrients to the myocardium.

Clinical Findings: Most common symptom is angina, although some individuals remain asymptomatic.

Nursing Focus

- Monitor vital signs and document response to prescribed therapies.
- Monitor and maintain cardiopulmonary function and enhance myocardial perfusion by implementing prescribed therapies.
- Document nursing and medical interventions and their outcomes.

Patient Teaching

- Provide Pt and family with literature about CAD.
- Explain lifestyle modifications necessary to control CAD.
- Review dietary restrictions and stress importance of reading food labels to avoid foods high in sodium, saturated fats, *trans* fats, and cholesterol.
- Explain actions, dosages, side effects, and adverse reactions of meds.
- Provide information about resumption of sexual activity acceptable for Pt's medical condition.
- If surgery is to be performed, provide preoperative teaching to prepare Pt and family for procedure, ICU, postoperative care, and cardiac rehabilitation.

Crohn's Disease

Definition: Type of inflammatory bowel disease (IBD). Crohn's disease usually occurs in the ileum, but it can affect any part of the digestive tract from mouth to anus. Diagnosis is sometimes difficult because Crohn's disease often resembles other disorders including irritable bowel syndrome and ulcerative colitis.

Clinical Findings: Most common symptoms are abdominal pain, often in lower right quadrant, and diarrhea. Rectal bleeding, weight loss, and fever may also occur. Anemia may occur if bleeding is persistent.

Nursing Focus

- Monitor intake and output and maintain fluid and electrolyte balance.
- Assess for skin breakdown and provide routine skin care.
- Unless contraindicated, fluid intake should be 3000 mL/day.
- Use calorie counts to ensure adequate nutrition.
- Monitor lab results.

Patient Teaching

- Provide Pt and family with literature on Crohn's disease.
- Instruct Pt that fluid intake should be ≥ 3 L/day, and meals should be small and frequent to maintain adequate nutrition.
- Teach Pt to minimize frequency and severity of future exacerbations by getting adequate rest and relaxation, reducing or avoiding stress, and maintaining adequate nutrition.
- Explain dosages, route, actions, and adverse reactions of meds.



Diabetes Mellitus (DM)

See EMERG/TRAUMA for management of hyperglycemia and hypoglycemia.

Definition: A chronic metabolic disorder marked by hyperglycemia. DM results either from a primary failure of pancreatic beta cells to produce insulin (type 1 DM) or from development of insulin resistance in body cells, with initial increased insulin secretion to maintain metabolism followed by eventual inability of pancreas to secrete enough insulin to sustain normal metabolism (type 2 DM).

Clinical Findings:

Type-1 Diabetes (previously called insulin-dependent diabetes mellitus [IDDM]): Weight loss, muscle wasting, loss of subcutaneous fat, polyuria, polydipsia, polyphagia, ketoacidosis.

Type-2 Diabetes (previously called adult-onset diabetes): Polyuria, polydipsia, pruritus, peripheral neuropathy, frequent infections, and delayed healing of wounds or sores.

Gestational Diabetes

(see OB PEDS/GERI)

Nursing Focus

- Routine assessment for hyperglycemia and hypoglycemia and their associated signs and symptoms.
- Monitor blood glucose level as ordered and document response to prescribed therapies.
- Assess body systems for complications associated with effects of diabetes.

Patient Teaching NCLEX

- Provide Pt with literature on managing diabetes.
- Encourage necessary lifestyle changes including weight reduction if overweight, dietary modifications, and exercise.
- Explain purpose, dosage, route, and side effects of insulin and/or oral hypoglycemic agents.
- If self-administered insulin is prescribed, ensure Pt's ability to demonstrate appropriate preparation and administration.
- Educate Pt on proper foot care to minimize risk of injury.
 - Advise Pt about importance of never going barefoot, either outside or around the house, and emphasize that soft slippers or socks do not provide any protection from injury.
 - Instruct Pt to inspect feet every day, and use a mirror or ask someone to help if he or she has difficulty performing this task alone, and to notify health-care professional of any untoward findings (e.g., cuts, scratches, skin cracks, calluses, ulcers, puncture wounds, or ingrown toenails).
 - Instruct Pt to wash feet daily, thoroughly dry, and apply moisturizing lotion to entire foot (not between toes).
 - Emphasize that Pts who have been diagnosed with diabetic neuropathy should have routine nail care performed by health-care professional or diabetic foot-care specialist.

Diabetes Facts

- **Glucagon:** Hormone secreted by alpha cells of pancreas in response to low blood sugar that increases blood glucose levels by stimulating liver to convert stored glycogen into glucose.
- **Glycogen:** Excess carbohydrates stored in liver and muscles.
- **Glycosuria:** Glucose present in urine. A diagnostic sign of diabetes.
- **Insulin:** Hormone secreted by beta cells of pancreas in response to high blood glucose. Insulin is required for transport of glucose across cell membrane. Inadequate insulin level or cellular resistance to insulin results in elevated blood glucose levels (hyperglycemia).
- **Ketones:** Byproduct of metabolism of fat and protein. Body responds to excess ketones (ketoacidosis) by increasing respiratory rate.
- **Polydipsia:** Excessive thirst; diuresis causes cellular dehydration and fluid and electrolyte depletion, resulting in excessive thirst.
- **Polyphagia:** Hunger; caused by cellular starvation, secondary to decreased amount of glucose available to cells.
- **Polyuria:** Excessive urination; as excess glucose flows or “spills over” from kidneys, it pulls water with it by osmosis, resulting in diuresis, which leads to dehydration.

NCLEX

Hypertension (HTN)

Definition: Persistent or intermittent elevation of systolic BP (SBP) >140 mm Hg or diastolic BP (DBP) >90 mm Hg.

Primary (Essential) HTN

Clinical Findings: Typically asymptomatic, primary HTN is usually not recognized until secondary complications develop, including atherosclerosis, TIAs, strokes, MI, left ventricular hypertrophy, CHF, and renal failure.

Secondary HTN

Clinical Findings: Variable, but most common symptoms are CV and neurological (malaise, weakness, fatigue, flushing of the face, headache, dizziness, lightheadedness, nose bleeds, ringing in the ears, or blurred vision) as well as symptoms associated with underlying etiology.

Four Stages of HTN

- Normal BP: SBP <120 mm Hg and DBP <80 mm Hg.
- Prehypertension: SBP 120–139 mm Hg or DBP 80–89 mm Hg.
- HTN Stage I: SBP 140–159 mm Hg or DBP 90–99 mm Hg.
- HTN Stage II: SBP ≥ 160 mm Hg or DBP ≥ 100 mm Hg.

Nursing Focus

- Monitor vital signs and document response to prescribed therapies for reducing blood pressure.
- Assess for signs of end-organ dysfunction (angina, low serum potassium levels, elevated serum creatinine and BUN, proteinuria, and uremia).
- Implement collaborative care such as administering antihypertensive meds.
- Caution: It is critical that BP be reduced gradually; excessive and rapid reduction in BP can precipitate cerebral, myocardial, and renal ischemia.

Patient Teaching

- Provide Pt with literature on reducing high blood pressure.
- Encourage necessary lifestyle modifications including weight reduction (for Pts who are overweight), limiting alcohol intake to one drink per day, increased physical activity (30–45 minutes/day), and smoking cessation.
- Review dietary guidelines and stress importance of reading food labels to avoid processed foods high in sodium, saturated fats, *trans* fats, and cholesterol.
- Provide information to help Pt reduce intake of sodium, saturated fats, and cholesterol, and keep consumption of *trans* fats to an absolute minimum.
- Explain importance of maintaining adequate intake of potassium, calcium, and magnesium.
- Explain actions, dosages, side effects, and adverse reactions of HTN meds.

Irritable Bowel Syndrome (IBS)

Definition: Condition marked by abdominal pain (often relieved by passage of stool or gas), disturbances of evacuation (constipation, diarrhea, or alternating episodes of both), bloating and abdominal distention, and passage of mucus in stools.

Clinical Findings: Classic IBS symptoms include abdominal pain, flatus, constipation, and diarrhea.

Nursing Focus

- Monitor hydration, intake, and output.
- Encourage Pt to eat small meals at regular intervals.

- Encourage fluids; goal is eight glasses of water per day.
- Encourage frequent ambulation.

Patient Teaching

- Provide Pt and family with literature on IBS.
- Encourage necessary lifestyle changes to promote stress reduction.
- Encourage regular exercise, such as walking 30 minutes/day.
- Suggest Pt get adequate sleep and avoid becoming fatigued.
- Suggest Pt eat frequent, small meals throughout the day and avoid foods and beverages identified as triggers, such as wheat, barley, rye, chocolate, dairy, caffeine, or alcohol.
- Explain actions, dosages, side effects, and adverse reactions of meds.

Multiple Sclerosis (MS)

Definition: Chronic and progressive disorder of brain and spinal cord (CNS) caused by damage to myelin sheath (white matter). Destruction of myelin sheath leads to scarring (sclerosis), which decreases and eventually blocks nerve conduction.

Clinical Findings: Weakness, paresis, or paralysis of one or more limbs, myoclonus (involuntary muscle jerks), impaired or double vision, eye and facial pain, fatigue, dizziness, decreased coordination, and loss of balance.

Nursing Focus

- Goal of therapy is to control symptoms and preserve function to maximize quality of life.
- Perform or arrange for ROM exercises to be done twice a day.
- Assess skin for breakdown and perform routine skin care.

Patient Teaching

- Provide Pt and family with literature on MS.
- Encourage healthful and active lifestyle that includes exercise to maintain good muscle tone, good nutrition, and plenty of rest and relaxation.
- Stress importance of avoiding stress and fatigue.
- Depending on progression of MS, arrange for occupational, physical, and speech therapy.
- Explain actions, dosages, side effects, and adverse reactions of all meds, which may include steroids and immunosuppressant therapy, antiviral agents, muscle relaxants, and/or antidepressants.

Pancreatitis

Definition: Inflammation of pancreas caused by activation of pancreatic enzymes within pancreas that digest pancreas itself.

Clinical Findings: Classic symptom of pancreatitis is abdominal pain that radiates toward the back and increases when supine. Other symptoms include swollen and tender abdomen that may worsen after eating, nausea, vomiting, fever, and tachycardia.

Nursing Focus

- Goals of treatment are pain management, supportive care, and prevention of secondary complications.
- Assess lab results for elevated levels of serum amylase and serum lipase.
- Monitor glucose, Ca^{++} , Mg^{++} , Na , K^{+} , and bicarbonate levels.

Patient Teaching

- Provide Pt and family with literature on pancreatitis.
- Teach Pt to avoid alcoholic beverages and decrease consumption of foods high in fat.
- Provide teaching before diagnostic procedures, which include abdominal ultrasound to look for gallstones and CT scan to look for inflammation and destruction of pancreas.
- Explain dosages, route, actions, and adverse reactions of meds.

Peripheral Vascular Disease (PVD)

Definition: Disease of peripheral blood vessels characterized by narrowing and hardening of arteries that supply legs and feet. Decreased blood flow results in nerve and tissue damage to extremities.

Clinical Findings: Intermittent claudication (leg pain on activity that is relieved with rest), weak or absent peripheral pulses, pallor or cyanosis, numbness, cool extremities, and minimal to no hair growth on extremities.

Nursing Focus

- Assess and monitor distal circulation and sensory and motor function.
- Prevent pressure sores with frequent position changes and assessment.
- Encourage and assist with frequent ambulation.

Patient Teaching

- Provide Pt and family with literature on PVD.
- Encourage light-to-moderate activity alternated with periods of rest.
- Explain options available for smoking cessation.
- Teach Pt to reduce intake of saturated fats, *trans* fats, and cholesterol.
- Explain proper foot care such as wearing shoes that fit properly (avoid open-toed/heel shoes), keeping feet clean and dry, and minimizing risk of injury by never going barefoot. Inspect bottom of feet daily for injuries.
- Encourage leg exercises (ankle rotations) and/or a walking regimen.
- Explain dosages, route, actions, and adverse reactions of meds.



Renal Failure—Chronic (CRF)

Definition: Gradual and progressive loss of ability of kidneys to excrete wastes, concentrate urine, and conserve electrolytes. In contrast, acute renal failure occurs suddenly.

Clinical Findings: Edema throughout the body, shortness of breath, fatigue, flank pain, oliguria (progressing to anuria), elevated BP, and pale skin.

Nursing Focus

- Never measure BP or perform venipuncture on an arm with a dialysis shunt.
- Help minimize discomfort from frustrations with fluid restrictions by offering ice chips, frozen lemon swabs, diversional activities, and hard candies.
- Provide routine skin care; uremia causes itching and dryness of skin.
- Monitor BUN and serum creatinine levels.
- Monitor strict fluid intake and output; fluids are typically restricted to an amount equal to previous day's urine output plus 500–600 mL.
- Perform frequent turning and ROM exercises to minimize skin breakdown.

Patient Teaching

- Provide Pt and family with literature on CRF and/or dialysis.
- Restrict sodium, water, potassium, phosphate, and protein intake as ordered.
- Encourage compliance with secondary preventive measures.
- Explain actions, dosages, side effects, and adverse reactions of meds.

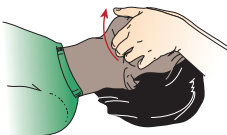
Resuscitation Maneuvers

Head-Tilt, Chin-Lift



Jaw-Thrust Maneuver

For known or suspected trauma

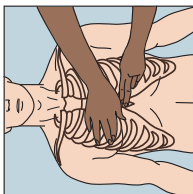


Pulse Check: Adult/Child (Carotid)



Hand Placement: Adult/Child

Lower half of sternum (use heel of one hand for child)



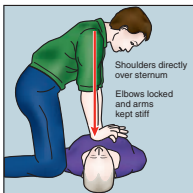
Relief of Foreign Body: Conscious Adult/Child

Use chest thrusts for pregnant or obese Pts



Relief of Foreign Body: Unresponsive Adult/Child

Same as for CPR

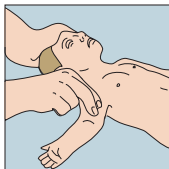


Resuscitation Maneuvers

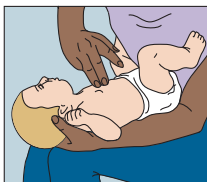
Head-Tilt, Chin-Lift: Infants
Do not hyperextend neck



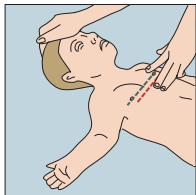
Pulse Check: Infants
(Brachial)



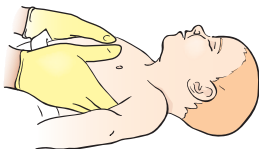
Back Blows and Chest Thrusts: Infants
Always support infant's head and neck



One Rescuer
(One finger width below nipples)



Two Rescuers
(Both thumbs, hands encircling chest)



NCLEX CPR: Quick Reference
Determine Unresponsiveness

- **Adult:** Call 911 first: Get help and/or AED if available.
- **Child or infant:** Call 911 after 2 minutes (five cycles) of CPR.

Airway

Open airway.

- **All ages:** Head-tilt, chin-lift.
- **All ages:** If trauma suspected, use jaw-thrust method.

Breathing

Assess for breathing.

- If not breathing, give two slow breaths at 1 second/breath.
- If unsuccessful, reposition airway and reattempt to ventilate.
- **If still unsuccessful, see Choking—Quick Reference.**

Circulation

Check for pulse for up to 10 seconds.

- Pulse present, but Pt not breathing: Begin rescue breathing.
- No definite pulse after 10 seconds: Begin chest compressions.

Defibrillation/AED*

- Give 2 minutes of CPR between shocks (*AEDs may not reflect updated AHA standards; follow AED voice prompts).
- **Adults:** Do not use pediatric pads (must be >8 yr or >80 lb).
- **Child:** May use adult pads if pediatric pads unavailable.
- Recheck pulse after every 2 minutes of CPR.

	Adult	Child and Infant	Newborn
Ventilations	10–12/min; ET: 8–10/min	15–20/min; ET: 8–10/min	40–60/min
Pulse check	Carotid.	Child: Carotid. Infant: Brachial.	Brachial or umbilicus.
Events/min	100/min.	100/min.	120/min.
Ratio	30:2 (1 or 2 rescuers).	30:2 (15:2 if 2 rescuers).	3:1 (1 or 2 rescuers).

Continued

	Adult	Child and Infant	Newborn
Depth	1½–2 inches.	½–⅓ depth of chest.	⅓ depth of chest.
Hand position	Lower half of sternum.	Child: same as adult; Infant/Newborn: one finger width below nipple line.	
Adult: Adolescent and older; Child: 1 year to adolescent; Infant: <1 year; Newborn: Birth to 1 month.			

NCLEX

Choking: Quick Reference**Assess for Airway Obstruction**

- Grasping at throat with hands.
- Inability to speak, breathe, cough, or cry (infants).

Conscious Victim

- Able to cough effectively
 - **All ages:** Keep victim calm and encourage coughing.
- Unable to breathe or cough effectively
 - **Adult/child:** Abdominal thrusts until obstruction relieved or victim becomes unresponsive.
 - **Infant:** Alternate five back blows and five chest thrusts until obstruction relieved or unresponsiveness occurs.
 - **Pregnant/obese victims:** Use chest thrusts until obstruction relieved or victim becomes unresponsive.

Unresponsive Victim

- **Adults:** Call 911 first and then begin CPR.
- **Child:** Call 911 after five cycles of CPR.
- Lay victim flat on back and look inside mouth while opening airway.
- Use finger sweep and attempt to remove obstruction (only if visible).
- Attempt to give two rescue breaths.
- Begin CPR if breaths do not go in.
- Repeat steps: Inspect mouth, remove obstruction if seen, give two rescue breaths, give 30 chest compressions, and repeat until obstruction relieved.

Recovery Position



Selected Emergency Drugs

Drug	Indication and Dosage
Activated charcoal	Overdose, Poisoning (see page 155) <ul style="list-style-type: none"> Adults: 1 gram/kg PO or NG. Peds: same as adult dose.
Adenosine	SVT (supraventricular tachycardia) <ul style="list-style-type: none"> Adults: 6 mg rapid IV, repeat 12 mg \times 2. Peds: 0.1 mg/kg rapid IV, repeat 0.2 mg/kg \times 2.
Albuterol	Bronchospasm <ul style="list-style-type: none"> Adults: 2.5 mg nebulized every 10 minutes. Peds: 0.15 mg/kg (0.3 mL/kg).
Amiodarone	Unstable V-Tach <ul style="list-style-type: none"> Adults: 150 mg IV over 10 minutes. Peds: 5 mg/kg over 20–60 minutes. VF or VT Arrest <ul style="list-style-type: none"> Adults: 300 mg IV, repeat 150 mg. Peds: 5 mg/kg IV.
Aspirin	Acute Coronary Syndrome (ACS) <ul style="list-style-type: none"> Adults: 160–325 mg PO chewable (non-EC).
Atenolol	Acute Coronary Syndrome (ACS) <ul style="list-style-type: none"> Adults: 5 mg slow IV (over 5 minutes).
Atropine	Bradycardia <ul style="list-style-type: none"> Adults: 0.5–1 mg IV every 3–5 minutes, max 3 mg. Peds: 0.02 mg/kg IV. May double and repeat once; minimum 0.1 mg, maximum 1 mg.
Dextrose	Hypoglycemia <ul style="list-style-type: none"> Adults: 12.5–25 grams slow IV. Peds: 0.5–1 gram/kg slow IV; (D50: 1–2 mL/kg; D25: 2–4 mL/kg; D10: 5–10 mL/kg).

Continued

Drug	Indication and Dosage
Diazepam	Seizures, Status Epilepticus <ul style="list-style-type: none"> • Adults: 5–10 mg slow IV, repeat every 10–15 minutes, max 30 mg. Rectally: 0.2 mg/kg. • Peds: 0.2 mg/kg slow IV, every 2–5 minutes, max 5 mg. Rectally: 0.3 mg/kg.
Diltiazem	A-Fib/A-Flutter <ul style="list-style-type: none"> • Adults: 15–20 mg slow (2 minutes) IVP.
Diphenhydramine	Allergic Reaction, Anaphylaxis <ul style="list-style-type: none"> • Adults: 25–50 mg IV, IM. • Peds >10 kg: 1.25 mg/kg.
Dobutamine	Pump Problem, Heart Failure <ul style="list-style-type: none"> • Adults: 2–20 mcg/kg/min IV drip. • Peds: Same as adult dose.
Dopamine	Pump Problem, Heart Failure <ul style="list-style-type: none"> • Adults: 2–20 mcg/kg/min IV drip. • Peds: Same as adult dose.
Epinephrine 1:10,000	Cardiac Arrest <ul style="list-style-type: none"> • Adults: 1 mg IV every 3–5 minutes. • Peds IV: 0.01 mg/kg (0.1 mL/kg). • Peds ET: Use 1:1000 0.1 mg/kg (0.1 mL/kg) ET.
Epinephrine 1:1000	Bronchospasm <ul style="list-style-type: none"> • Adults: 0.3–0.5 mg sub-Q. • Peds: 0.01 mg/kg (0.01 mL/kg) sub-Q, max 0.5 mg.
Fentanyl	Pain Management <ul style="list-style-type: none"> • Adults: 0.5–1 mcg/kg/dose IV • Peds: 1–2 mcg/kg/dose IV. Rapid Sequence Intubation (RSI) <ul style="list-style-type: none"> • Adults: 2–10 mcg/kg IV. • Peds: 0.5–1 mcg/kg IV, max 4 mcg/kg.
Flumazenil	Benzodiazepine Overdose <ul style="list-style-type: none"> • Adults: 0.2 mg IV every minutes, max 3 mg. • Peds: 0.01 mg/kg.
Furosemide	Pulmonary Edema <ul style="list-style-type: none"> • Adults: 0.5–1 mg/kg IV (over 1–2 minutes). • Peds: 1 mg/kg.

Drug	Indication and Dosage
Glucagon	Beta Blocker Overdose, Hypoglycemia <ul style="list-style-type: none"> • Adults: 1 mg IV, IM. • Peds <20 kg: 0.5 mg IV, IM.
Ipratropium 0.02%	Bronchospasm <ul style="list-style-type: none"> • Adults: 0.5 mg nebulized with albuterol. • Peds: 25 mcg/kg nebulized with albuterol.
Isuprel	Bradycardia (Heart Transplant Patients) <ul style="list-style-type: none"> • Adults: 2–10 mcg/min IV.
Labetalol	Hypertension, Hypertensive Crisis <ul style="list-style-type: none"> • Adults: 10 mg IVP over 1–2 minutes.
Lidocaine	V-Fib, V-Tach <ul style="list-style-type: none"> • Adults: 1–1.5 mg/kg IV, max 3 mg/kg. • Peds: 1 mg/kg, max 100 mg.
Magnesium	Hypomagnesemia, Torsade de Pointes <ul style="list-style-type: none"> • Adults: 1–2 gm IV. • Peds: 20–50 mg/kg (max 2 grams) IV over 10–20 minutes.
Mannitol	Increased ICP (Intracranial Pressure) <ul style="list-style-type: none"> • Adults: 0.5–1 gram/kg IV over 5–10 minutes. • Peds: 0.2–0.5 gram/kg over 30–60 minutes.
Methylprednisolone	Allergic Reaction, Anaphylaxis <ul style="list-style-type: none"> • Adults: 1–2 mg/kg IV. • Peds: Same as adult dose.
Midazolam	Sedative <ul style="list-style-type: none"> • Adults: 1–2 mg IV every 2 minutes. • Peds: 0.05–0.2 mg/kg.
Morphine	ACS, Pain Management <ul style="list-style-type: none"> • Adults: 1–2 mg increments IV. • Peds: 0.1–0.2 mg/kg.
Naloxone	Narcotic Overdose <ul style="list-style-type: none"> • Adults: 0.4–2 mg IV every 2–3 minutes. • Peds: 0.1 mg/kg.
Nitroglycerin	Ischemic CP, ACS <ul style="list-style-type: none"> • Adults: 0.4 mg SL every 3–5 minutes × 3.

Continued

Drug	Indication and Dosage
Ondansetron	Nausea <ul style="list-style-type: none"> Adults: 4 mg IV, IM. Peds: ≤ 40 kg: 0.1 mg/kg IV; >40 kg: 4 mg IV, IM.
Procainamide	V-Fib, V-Tach <ul style="list-style-type: none"> Adults: 20–50 mg/min IV, max 17/kg. Peds: 15 mg/kg over 30–60 minutes.
Vasopressin	Asystole, PEA, V-Fib <ul style="list-style-type: none"> Adults: 40 units IV once.

ACS: acute coronary syndrome; **EC:** enteric coated; **PEA:** pulseless electrical activity; **VF, V-Fib:** ventricular fibrillation; **VT, V-Tach:** ventricular tachycardia.

NCLEX

ACLS (Pulseless Arrest)**Asystole/PEA**

- Confirm asystole in two leads.
- **CPR:** Perform five cycles of CPR (about 2 minutes).
- **Epinephrine:** 1 mg IV or IO (2–2.5 mg ET) every 3–5 minutes *or* **Vasopressin:** 40 units IV or IO, one time only (may be used to replace 1st or 2nd dose of epinephrine).
- **Atropine:** 1 mg IV or IO (2–3 ET) every 3–5 minutes (max 3 mg) for asystole or bradycardia PEA (rate <60).

V-Fib or Pulseless VT

- **CPR:** Perform 5 cycles of CPR (shock first if witnessed).
 - **Shock:** Biphasic: 120–200 J; monophasic: 360 J.
 - Resume CPR for 2 minutes.
- Goal: To give all medications without interrupting CPR.**
- **Epinephrine:** 1 mg IV or IO (2–2.5 mg ET) every 3–5 minutes *or* **Vasopressin:** 40 units IV or IO, one time only (may be used to replace 1st or 2nd dose of epinephrine).
 - **Shock:** Biphasic: 120–200 J; monophasic: 360 J.

Consider Antiarrhythmics

After 2 minutes of CPR:

- **Amiodarone:** 300 mg IV or IO, repeat 150 mg in 3–5 minutes.
- **Lidocaine:** 1.0–1.5 mg/kg IV or IO, repeat 0.5–0.75 mg/kg every 5–10 minutes, max 3 mg/kg.
- **Magnesium:** 1–2 gram IV or IO for torsade de pointes.

Search for and Manage Reversible Causes

Hypovolemia	Toxins
Hypoxia	Tamponade (cardiac)
Hydrogen Ion (acidosis)	Tension pneumothorax
Hypo/Hyperkalemia	Thrombosis (coronary)
Hypoglycemia	Thrombosis (pulmonary)
Hypothermia	Trauma

NCLEX ACLS (Unstable Arrhythmias)

Unstable: CP, ↓BP, SOB, or AMS—require immediate intervention!

Unstable Bradycardia (HR <60 bpm)

- **Pace:** Prepare for transcutaneous pacing (TCP). **Do not delay** for 2nd degree type 2 or 3rd degree AV block.
- **Atropine:** 0.5 mg IV every 3–5 minutes to a max of 3 mg.
- Consider **Epinephrine:** 2–10 mcg/min or **Dopamine:** 2–20 mcg/kg/min infusion if TCP is ineffective or unavailable.
- Definitive care may require transvenous pacing.
- Search for and manage reversible causes.

Unstable Tachycardia—All Types

- Perform immediate synchronized cardioversion.

Rhythm	Waveform	Sequence
• Monomorphic VT	Monophasic	100 J, 200 J, 300 J, 360 J
	Biphasic	100–120 J (escalate as needed)
• SVT	Monophasic	50 J, 100 J, 200 J, 300 J, 360 J
	Biphasic	100–120 J (escalate as needed)
• Polymorphic VT	Monophasic	360 J (treat as pulseless VT)
	Biphasic	120–200 J (high-energy shock)

Monomorphic = all QRS are identical; Polymorphic = QRS differ in shape.

- Consider torsade de points with all polymorphic VT.
- Premedicate whenever possible—sedative and analgesics.
- If synchronization delayed and clinical situation is critical, go immediately to unsynchronized cardioversion at 120–200 J biphasic or 360 J monophasic.
- **Lidocaine** infusion at 1–4 mg/min if cardioversion successful.

Ventricular Ectopy (Including Nonsustained VT)

- Refer to following specific arrhythmia.
- **NEVER** give antiarrhythmics for ventricular escape rhythms/beats!
- Lidocaine 1–1.5 mg/kg IV. Repeat 0.5–0.75 mg/kg every 5–10 minutes (max 3 mg/kg). Infusion: 1–4 mg/min.

ACLS (Stable Arrhythmias)

- **Note:** Treatment should not be based on HR alone! If Pt is otherwise asymptomatic (NO CP or SOB, stable BP, etc.), implement supportive care measures and search for reversible causes.
- If Pt becomes unstable, see **Unstable Arrhythmias**.

Bradycardia (HR <60 bpm)

- Monitor and supportive care as needed.
- Common causes of nonsymptomatic bradycardia include excellent physical conditioning (e.g., athletes), medication (e.g., beta blockers, digoxin).

Narrow-Complex Tachycardia

Regular Rhythm (SVT: HR >150 bpm)

- **Valsalva maneuver:** Instruct Pt to cough or bear down.
- **Adenosine:** 6 mg rapid (over 1–3 seconds) IV push followed with 20 mL NS flush. Repeat for recurrence SVT at 12 mg every 1–2 minutes (max 30 mg).

Irregular Rhythms

- Most likely A-fib/flutter or multifocal atrial tachycardia.
- Definitive care may require rate control with diltiazem or beta blockers.

Wide-Complex Tachycardia

Regular Rhythm (VT or Uncertain Rhythm)

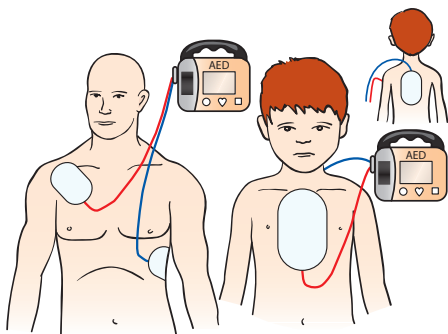
- **Amiodarone:** 150 mg IV given over 10 minutes repeated as needed to a max of 2.2 g/24 hr.
- Prepare for synchronized cardioversion.

Irregular and Polymorphic Rhythms

- **Torsade de pointes: Magnesium** 1–2 grams over 5–60 minutes followed by a magnesium infusion of 0.5–1 gram/hr titrated to control of torsades.
- **A-Fib with WPW:** Antiarrhythmics (e.g., **amiodarone** 150 mg IV over 10 minutes). **WPW:** HR usually >250 bpm, presence of delta wave, wide QRS. **Avoid adenosine, beta blockers, calcium channel blockers, and diltiazem.**

Automatic External Defibrillator (AED)

- **Assessment:** Determine unresponsiveness and assess ABCs.
 - Children 1–8 years, get help/AED after 2 minutes of CPR.
 - Adults ≥ 8 years, get help/AED immediately.
- **CPR:** Perform CPR until AED arrives.
- **Power:** Turn on AED and follow voice prompts.
- **Attach pads:** Stop CPR, attach appropriate size pads to Pt and plug pad cable into AED unit if needed.
 - Position pads according to manufacturer's guidelines.
- **Analyze:** Press "Analyze" button and wait for instructions (don't make contact with Pt while AED is analyzing rhythm).
- **Shock:** Announce "shock indicated, stand clear," and ensure no one is in contact with Pt.
 - Fully automatic units analyze rhythm and shock if indicated.
 - Semiautomatic units analyze rhythm and then instruct operator to press the "Shock" button if indicated.



Manual Defibrillation

- **Power:** Turn unit on and verify all cables are connected.
- **Lead select:** Turn "lead select" to "paddles" or "defibrillator."
- **Select energy level:** **Biphasic:** 120–200 J; **monophasic:** 360 J.
- Apply conductive medium to paddles or apply gel pads to Pt's chest.
- **Paddle placement*:** Sternum (upper right sternal border) and cardiac apex (lower, left-lateral chest). If using **hands-free defibrillation pads**, follow manufacturer's guidelines (similar to AED—see earlier diagram).
- **Verify rhythm:** Confirm V-fib or pulseless VT.
- **Charge defibrillator:** Say, "Charging, stand clear!"
- **Clear:** Say, "I'm going to shock on three. One, I'm clear, two, you're clear, three, everybody's clear."
- **Defibrillate:** **Biphasic:** 120–200 J; **monophasic:** 360 J.
- **CPR:** Immediately resume CPR for five cycles (about 2 minutes).
- **Reassess rhythm:** Refer to appropriate algorithm.

***Hand-held paddles:** Apply 25 lb of pressure to both paddles and depress both paddle discharge buttons simultaneously. **Hands-free defibrillation pads:** Do not contact pads! Depending on type of defibrillator, either press "shock" button on defibrillator or depress both paddle discharge buttons (while docked in defibrillator) simultaneously.

Synchronized Electrical Cardioversion

Indication

- Symptomatic stable or unstable tachycardia (with pulses).

Contraindication

When to use unsynchronized mode.

- No pulse, severe prearrest shock, or polymorphic VT.

Technique

- Sedate when clinical situation permits.
- Turn on defibrillator, attach ECG electrodes, press “synch” button, and verify that R waves are sensed by machine.¹
- It may be necessary to adjust gain until each R wave has a synch-marker.
- Select energy level based on arrhythmia.

Rhythm	Waveform	Sequence
• Monomorphic VT	Monophasic	100 J, 200 J, 300 J, 360 J
	Biphasic	100-120 J (escalate as needed)
• SVT	Monophasic	50 J, 100 J, 200 J, 300 J, 360 J
	Biphasic	100–120 J (escalate as needed)
• Polymorphic VT	Monophasic	360 J (treat as pulseless VT)
	Biphasic	120–200 J (high-energy shock)

Monomorphic = all QRS are identical; Polymorphic = QRS differ in shape.

- **Cardiovert:** Follow same steps² for defibrillation (see page 145).
- **Assess rhythm:** Refer to appropriate algorithm for treatment.³



¹If QRS too wide for machine to identify R-waves, switch to unsynchronized cardioversion (follow steps for Manual Defibrillation on page 145).

²Delays are normal. Do not release discharge buttons until shock delivered.

³Most defibrillators default back to nonsynchronized mode after each synchronized cardioversion. If subsequent synchronized cardioversion is needed, confirm defibrillator is in synchronized mode.

Transcutaneous Pacing

Indications

- Symptomatic 2nd-degree type II or 3rd-degree AV block.
- Symptomatic bradycardia unresponsive to atropine.
- Bradycardia with ventricular escape rhythms.
- May be useful in witnessed rhythm degradation to asystole.
- Overdrive pacing of tachycardia refractory to drug therapy or electrical cardioversion (to be performed by MD only).
- When standby or demand pacing is indicated.

Contraindications

- Severe hypothermia (not recommended for asystole).

Pacing Modes

- **Demand** (synchronous) mode senses Pt's heart rate and paces only when heart rate falls below predetermined rate.
- **Fixed** (asynchronous) mode paces at a predetermined rate regardless of Pt's heart rate.

Procedure

- **Pads:** Apply pacing electrodes to Pt per package instructions.
- **Power:** Turn on pacemaker and ensure cables are connected.
- **Rate:** Set demand rate to 60 bpm and adjust up or down, based on Pt's response, once pacing initiated.
- **Current:** Output ranges from 0–200 milliamperes (mA).
- **Technique:** Increase mA from minimum setting until consistent capture* is achieved, and then increase by 2 mA.

*Capture is characterized by pacer spikes, a wide QRS, and broad T waves. Avoid using carotid artery to confirm mechanical capture since muscular jerking (from pacing) can mimic a carotid pulse.

Medical Emergencies

Initial Assessment and Intervention for All Pts

Assessment (as applicable)

- Neurological status, level of alertness, level of consciousness.
- Airway, respiratory, and circulatory status (ABCs).
- Palpate radial pulse for rate and rhythm and character.
- If Pt monitored, assess ECG and treat arrhythmias per ACLS.
- SAMPLE history (page 28).
- Baseline VS (HR, RR, BP, SpO₂, Temp).
- Pain/symptom characteristics (see OPQRST).

Intervention (as applicable)

- Establish and maintain ABCs.
- Treat life-threatening emergencies immediately.
- Initiate emergency interventions (e.g., call a code, defibrillation, etc.).
- Place Pt in position of comfort and offer reassurance.
- Administer oxygen as indicated and titrate to SpO₂ >90%.
- Notify physician of change in Pt status including pertinent assessment findings and interventions, if any implemented.
- Obtain IV access as ordered and titrate to SBP >90 mm Hg.
- Obtain labs, ECG, and imaging studies as ordered.
- Document assessments, any interventions, and outcome.

Abdominal Pain

Clinical Findings

Neuro: Anxiety, restlessness.

Resp: Increased respiratory rate and/or distress.

CV: Increased heart rate and/or hypotension.

Skin: Fever and/or cool, pale, and diaphoretic.

GI/GU: Anorexia, hyperactive, hypoactive, or absent bowel sounds, nausea, vomiting, diarrhea, constipation, GI bleeding.

MS: Abdominal tenderness, distention, rigidity, guarding, flank pain, palpable pulsatile mass, fatigue, malaise.

Collaborative Management

- Inquire about recent bowel habits including laxatives or enemas.
- Inspect abdomen for symmetry and distention.
- Auscultate bowel sounds (hyper/hypoactive or absent).

- Palpate all abdominal quadrants for masses, pulsations, tenderness, and rigidity (from area of least tenderness to area of most tenderness).
- Assess NG tube placement and output if present.
- Assess indwelling urinary catheter if present to ensure drainage, and record amount, color, and clarity of urine (consider bladder scan if no catheter).
- Obtain STAT bedside blood glucose level if Pt is diabetic.
- Test emesis/NG drainage and/or stool for occult blood.
- Administer antiemetic and pain medication if ordered.
- Insert NG tube and initiate nasogastric suctioning as ordered.
- Perform bladder scan and/or insert urinary catheter as ordered.

Allergic Reaction—Anaphylaxis

Clinical Findings

Neuro: Anxiety, restlessness.

Resp: Dyspnea, bronchospasm, wheezing, stridor, swelling of tongue or throat, respiratory arrest.

CV: Hypotension, localized or systemic edema, CV collapse.

Skin: Rash, itching, hives, cool, pale, cyanosis, diaphoresis.

Collaborative Management

- Remove source of allergic reaction (e.g., IV infusion, latex gloves, etc.).
- If Pt receiving blood transfusion, see Transfusion Reaction (page 162).
- Monitor airway, respiratory, and circulatory status closely.
- Assess for edema (specifically facial, lips, tongue, throat).
- Administer STAT medication as ordered by severity of symptoms.*

Severity	Pharmacological Intervention
Mild: itching, rash or hives only.	<ul style="list-style-type: none"> • Diphenhydramine: 25–50 mg IV, IM. • Cimetidine: 300 mg IV, IM, PO.
Moderate: above s/s plus swelling of lips or tongue, etc.	<ul style="list-style-type: none"> • Dexamethasone: 10 mg IV, IM <u>or</u> • Methylprednisolone: 40–125 mg IV, IM. • Albuterol: 2.5 mg nebulized in 3 mL NS.
Severe: above s/s plus dyspnea.	<ul style="list-style-type: none"> • Epinephrine (1:1,000): 0.3–0.5 mg SC.

*Give all drugs up to, and including, the Pt's level of severity.

Severity	Pharmacological Intervention
Critical: above s/s plus airway closure, hypotension (anaphylaxis).	<ul style="list-style-type: none"> • IV Fluids: Goal SBP >90 mm Hg. • Epinephrine (1:10,000): 0.1 mg (1 mL) IV. • Dopamine: Start at 10 mcg/kg/min. • Glucagon: 1 mg IV, IM (if unresponsive to epinephrine or Pt is taking beta blockers).

Altered Mental Status (AMS)

Clinical Findings

Neuro: Confused, lethargic, obtunded, stuporous, or comatose.

Resp: Depressed (likely opioid OD), Cheyne-Stokes (likely CVA), Kussmaul's respirations or fruity odor on breath (likely DKA), apneustic (likely brainstem injury), odor of alcohol (likely intoxicated), sweet almond odor (likely cyanide exposure).

CV: Increased BP and decreased HR (likely \uparrow ICP), hypotension (likely sepsis, MI, OD, internal bleeding), dysrhythmias.

Skin: Cool and moist (likely hypoglycemia, vasovagal response, MI, shock), warm and flushed (likely spinal injury, hyperglycemia, sepsis).

GI/GU: Nausea and vomiting, incontinence.

MS: Weakness, fatigue, abnormal flexion or extension, trauma.

Collaborative Management

- Place in lateral-lying position and suction airway as needed.
- Assess pupils and establish baseline GCS score.
- Assess for neuro deficits such as slurred speech, facial droop, or weakness or numbness on one side of the body.
- Obtain STAT bedside blood glucose level.
- Review MAR and labs for causes of AMS.
- Administer STAT medication as ordered:

Presentation	Medication
Hypoglycemia	Glucose 25 grams IV.
Narcotic OD	Naloxone 0.2–2 mg IV.
Benzodiazepine OD	Flumazenil 0.2 mg IV.

Bradycardia

Clinical Findings

Neuro: Dizziness, lightheadedness, AMS, syncope.

Resp: Shortness of breath.

CV: HR <60 beats/minute, hypotension, pulmonary congestion.

Skin: Cyanosis, coolness, pallor, diaphoresis.

GI/GU: Nausea and vomiting.

MS: Weakness, lethargy, fatigue, exhaustion.

Collaborative Management

- See bradycardia algorithm (this page).
- Assess LOC and orientation.
- Lay Pt flat and elevate feet 10°–15° if Pt feeling dizzy or faint.
- Assess for associated symptoms (CP, respiratory distress, or hypotension).
- Administer STAT medication as ordered (only if symptomatic):

Medication

Atropine 0.5 mg IV. Repeat every 5 minutes as needed up to 3 mg.

Chest Pain

Clinical Findings

Neuro: Anxiety, restlessness, dizziness, lightheadedness, syncope;

Pt may have sense of impending doom.

Resp: Shortness of breath, tachypnea, abnormal lung sounds.

CV: Tachycardia or bradycardia, signs of congestive heart failure.

Skin: Coolness, pallor, cyanosis, diaphoresis.

MS: Substernal pain, weakness, fatigue, sensation of chest heaviness or chest tightness.

GI/GU: Nausea and vomiting.

Collaborative Management

- Obtain STAT 12-lead and focused symptom analysis (OPQRST pages 27, 50).
- Administer STAT medication as ordered:

Medication

Nitroglycerin 0.4 mg SL (hold for BP <90 mm Hg)

Aspirin 325 mg chewed (nonenteric-coated)

Morphine 2–4 mg IV (hold for SBP <90)

Diabetic Emergencies

Clinical Findings

	Hypoglycemia	Hyperglycemia
History	Recent insulin shot, missed meal, excessive exercise.	Infection, stress, trauma, insufficient insulin intake.
Onset	Rapid (minutes).	Gradual (days to weeks).
Neurological	Confusion, delirium, coma, seizures .	Irritability, HA, double or blurred vision.
Respiratory	Normal respiratory pattern.	Deep and rapid (Kussmaul).
Breath	Normal (NO fruity odor).	Fruity (acetone) odor.
CV	Weak, rapid HR, SBP variable.	HR normal to fast, SBP variable.
Skin	Cool, pale, and diaphoretic.	Warm, dry, flushed.
GI/GU	n/v	Polydipsia, polyuria, n/v, abdominal cramps, dehydrated.
MS	Weakness, tremor, twitch.	Muscle wasting.
Blood sugar	<80 mg/dL.	>180 mg/dL.

Collaborative Management

- Obtain finger-stick blood glucose level.
- Administer STAT medication as ordered:

Presentation	Medication
Hypoglycemia	Glucose 25 grams IV.
Hyperglycemia	IV fluid, insulin (potassium as indicated).

Dizziness—Vasovagal Response—Syncope

Clinical Findings

Neuro: Dizziness, lightheaded, faintness, anxiety, syncope.

Resp: Shortness of breath, hyperventilation.

CV: Hypotension, tachycardia, bradycardia, chest pain, chest tightness or pressure, palpitations, dysrhythmias.

Skin: Cool, pale, and diaphoretic.

GI/GU: Nausea and vomiting.

MS: Weakness, fatigue.

Collaborative Management

- Stay with Pt until you can assist to chair or back to bed (if, during assist, Pt has syncopal episode, assist Pt to floor, call for help, then assess ABCs).
- Lay Pt flat and elevate foot of bed 10°–15°.
- If Pt is hyperventilating, encourage slow, deep breathing.
- Assess for neuro deficits such as slurred speech, unequal pupils, facial droop, or weakness or numbness on one side of the body.
- Assess for associated symptoms (CP, respiratory distress, or hypotension).
- Review MAR and labs for causes of dizziness or syncope.
- Obtain STAT bedside blood glucose level if Pt is diabetic.
- Obtain and document orthostatic vital signs (each set, 1 minute apart) from supine, sitting, and standing positions. Note: An increase in HR or decrease in SBP by 20 points from baseline is positive for orthostatic hypotension.

Hypertension

Clinical Findings

Neuro: Dizziness, lightheaded, vertigo, faintness, headache, anxiety, AMS, restlessness, visual disturbances, seizures.

Resp: Shortness of breath, hyperventilation.

CV: Tachycardia, bradycardia, chest pain, palpitations, dysrhythmias, dependent edema, symptoms of CHF.

Skin: Cool and moist, warm and flushed, tingling sensation.

GI/GU: Nausea and vomiting.

MS: Weakness, fatigue.

Collaborative Management

- **Note:** if SBP >220 or DBP >140 mm Hg, notify physician STAT.
- Elevate Pt's HOB to 30°–45°.
- Assess LOC and orientation.
- Palpate pulse for rate and rhythm. If Pt is monitored, assess ECG.
- Assess for neuro deficits such as slurred speech, unequal pupils, facial droop, or weakness or numbness on one side of body and other associated findings (chest pain, respiratory distress, rapid, thready pulse, or AMS).
- Obtain and record blood pressure readings in both arms.
- Administer antihypertensive medication as ordered.

Hypotension

Clinical Findings

Neuro: Anxiety, restlessness, dizziness, lightheadedness, decreased LOC, faintness, syncope.

Resp: Shortness of breath, respiratory distress.

CV: SBP <90 mm Hg, or SBP 40 mm Hg below Pt's normal baseline BP, tachycardia, bradycardia, chest pain, dysrhythmia.

Skin: Cool, pale, diaphoretic.

GI/GU: Nausea and vomiting, UO <30 mL/hour.

MS: Weakness, fatigue.

Collaborative Management

- Lay Pt flat, unless contraindicated by respiratory or airway compromise.
- Elevate foot of bed 10°–15°.
- Assess LOC and orientation.
- Assess for and control any bleeding with direct pressure.
- Anticipate and prepare for return to surgery if Pt is post-op.
- Assess for associated symptoms (chest pain, respiratory distress, AMS).
- Review medical record (medication, recent labs, and treatments) for possible causes of drop in BP.

Increasing Intracranial Pressure (ICP)

Clinical Findings

Cushing's Reflex: HTN, bradycardia, unequal pupils, irregular respirations, and hyperthermia.

Neuro: AMS, HA, sensitivity to light, irritability, double or blurred vision, seizures, hemiparesis, GCS <8, unequal pupils.

Resp: Abnormal respirations, tachypnea (late).

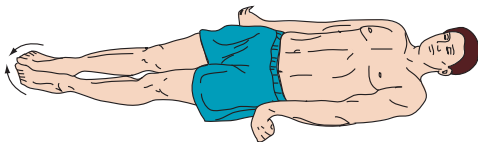
CV: HTN, Bradycardia (late), widening pulse pressure (late).

GI/GU: Nausea and vomiting.

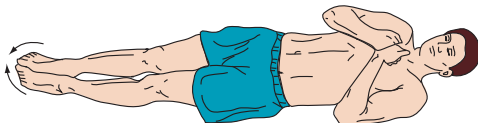
MS: Weakness, decreased motor function, posturing.

Collaborative Management

- Monitor pupils and GCS.
- **Controlled hyperventilation:** Decreases PaCO_2 , causing cerebral vasoconstriction and decreased ICP. Note: If capnography monitoring available, goal should be an EtCO_2 of 30 mm Hg.
- Keep head elevated to 30° , maintain head in neutral alignment and avoid flexion or rotation of neck.
- Closely monitor VS and neurological status (AVPU/GCS).
- Adjust IV to TKO; if hypotensive, titrate to SBP >90 mm Hg (avoid D5W).



NCLEX Abnormal Extension (decerebrate posturing)



NCLEX Abnormal Flexion (decorticate posturing)

Overdose (OD) and Poisoning

Clinical (Suggestive) Findings

CNS depressants (opioids, sedatives): Constricted pupils, drowsiness, weakness, coma, respiratory depression, pulmonary edema, apnea, bradycardia, hypotension, hypothermia.

CNS stimulants: (cocaine, amphetamines): Dilated pupils, anxiety, agitation, HA, psychotic, tachypnea, tachycardia, dysrhythmias, HTN, CP, diaphoresis, hyperthermia.

Carbon monoxide (CO): Cherry red lips and/or skin, weakness, fatigue, HA, dizziness, visual disturbances, ataxia, coma, dysrhythmias, respiratory distress, n/v.

Caustics (acids, alkalis): Chemical burns to the area of exposure or mouth and GI tract if ingested, pain, n/v, respiratory distress.

Hydrocarbons (gasoline, oil): Respiratory distress, odor on breath if ingested, bronchospasm, pulmonary edema, seizure.

Organophosphates (OPP): SLUDGEM (salivation, lacrimation, urination, defecation, gastric upset, emesis, muscle twitching).

Collaborative Management

- **Protect yourself**—either from potentially aggressive Pts or toxic exposures.
- Anticipate and prepare for respiratory and cardiovascular compromise.
- Position Pt on left side and suction airway as needed (for decreased LOC).
- Definitive treatment requires rapid identification of poison/exposure.
- Administer STAT antidote/reversal as ordered.

Caution: Avoid use of ipecac because vomiting may complicate or worsen clinical management of OD or poisoning.

Antidotes and Reversals

Acetaminophen (APAP, Tylenol)

- **Activated charcoal:** 1 gram/kg (**Peds:** same) PO, NG.
- **N-acetylcysteine:** 150 mg/kg in 250 mL D5W IV, IO over 60 minutes (**Peds <40 kg:** Same dose except use less D5W). **PO route** (if awake and not vomiting): 140 mg/kg (**Peds:** Same).

Aspirin (ASA, Bayer, Excedrin)

- **Activated charcoal:** 1 gram/kg (**Peds:** Same) PO, NG.
- **Sodium bicarbonate 8.4%:** 1 mEq/kg (**Peds:** Same) IV, IO.

Beta Blockers (metoprolol, Lopressor, atenolol, Tenormin)

- **Activated charcoal:** 1 gram/kg (**Peds:** same) PO or NG.
- **Glucagon:** 3 mg (**Peds:** 150 mcg/kg) IV, IO followed by 3 mg/hr (**Peds:** 3 mg/hr) infusion.

Calcium Channel Blockers (Adalat, Cardizem, Isonit) (Isoptin)

- **Activated charcoal:** 1 gram/kg (**Peds:** same) PO, NG.
- **Calcium chloride 10%:** 1–4 grams (**Peds:** 20–25 mg/kg) slow IV, IO.

Carbon Monoxide (CO)

- See General Hazmat Decontamination (page 177).

Caustics (acids and alkalis)

- See General Hazmat Decontamination (page 177).

Cholinergics (organophosphate, carbamates, nerve gas)

- Remove from source and remove Pt's clothing and jewelry.
- Decontaminate with copious NS or water.
- **Atropine:** 2–5 mg (**Peds:** 0.05 mg/kg) IV, IO, IM every 3–5 minutes.
- **Pralidoxime* (2-PAM):** 600 mg IM or may infuse 1–2 gram over 15–30 minutes (**Peds:** 20–50 mg/kg IM or infuse over 15–30 minutes). *Not recommended for carbamates!
- **Do not induce vomiting if substance ingested!** If Pt is alert with gag reflex, give water 5 mL/kg (max 200 mL) PO.

CNS Stimulants (cocaine, methamphetamine, speed, crank)

- Protect self and crew, wait for law enforcement.
- Minimize sensory stimulation, treat symptoms of ACS.
- **Activated charcoal:** 1 gram/kg (**Peds:** Same) PO if ingested.
- **Midazolam:** 1–2 mg (**Peds:** 0.05–0.2 mg/kg) IV, IO.

Cyanide Poisoning

- Protect self and crew, extricate Pt, remove Pt's clothing.
- **Amyl nitrite:** 1 ampule crushed and inhaled every 30 sec.
- **Na nitrite:** 300 mg (**Peds:** 10 mg/kg) IV, IO over 2–5 minutes.
- **Na thiosulfate:** 12.5 grams (**Peds:** 412.5 mg/kg) IV, IO over 5 minutes.
- **Hydroxocobalamin:** 5 grams (**Peds:** 70 mg/kg) IV over 15 minutes.

EPS (extrapyramidal symptoms)

- Symptoms associated with phenothiazines and tranquilizers.
- **Diphenhydramine:** 25–50 mg (**Peds:** 1 mg/kg) IV, IO, IM.

Hallucinogens (LSD, PCP, some mushrooms, mescaline, THC)

- Protect self and crew, wait for law enforcement.

- Minimize sensory stimulation.

- **Diazepam:** 2–5 mg (**Peds:** 0.1–0.2 mg/kg) IV, IO.

Narcotics/Opioids (heroin, methadone, Demerol, oxycodone)

- **Naloxone:** 0.4–2 mg (**Peds:** 0.1 mg/kg, max 2 mg) IV, IO, IM.

- **Nalmefene:** 0.5 mg/70 kg (**Peds:** 0.25 mcg/kg) IV, IO, IM.

Sedative-Hypnotics (benzodiazepines, rohypnol)

- **Flumazenil:** 0.2–0.5 mg (**Peds:** 0.01 mg/kg) IV, IO, IM.

Tricyclic Antidepressants (TCA, nortriptyline, amitriptyline)

- **Watch for tachycardia with widened QRS.**

- **Do not induce vomiting!** Rapid transport, O₂, monitor, IV.

- **Sodium bicarbonate 8.4%:** 1 mEq/kg (**Peds:** Same) IV, IO.

Postoperative Hemorrhage

Clinical Findings

Neuro: Early signs: anxiety, agitation, restlessness, lightheadedness; late signs: decreased LOC, confusion.

Resp: Shortness of breath, respiratory distress.

CV: Hypotension (late sign), tachycardia, capillary refill >3 seconds, diminished peripheral pulses.

Skin: Cool, pale, diaphoretic, cyanosis, mottled, ecchymosis.

GI/GU: Rigid, distended abdomen, periumbilical and/or retroperitoneal bruising, nausea, hematemesis, decreased UO, thirst.

MS: Weakness, fatigue.

Incision: Excessive swelling and ecchymosis

Other: Excessive wound drainage, saturated dressing, melena, excessive blood loss via chest tube or NGT

Collaborative Management

- Assess for and control external bleeding with direct pressure.

- Get help and notify surgeon STAT.

- Discontinue any thrombolytics or anticoagulants.

- Reinforce saturated dressing with additional dressing and pressure (do not remove saturated dressing).

- Lay Pt flat, unless contraindicated by respiratory or airway compromise.

- Elevate foot of bed 10°–15°.

- Monitor LOC and orientation.

- Obtain and record outputs (surgical drains, urinary catheter).
- Anticipate and prepare for Pt to return to surgery.

Respiratory Distress

Clinical Findings

Neuro: Anxiety, restlessness, confusion, AMS.

Resp: Dyspnea, tachypnea, bradypnea, use of accessory muscles, sternal retractions, wheezing, rales, stridor, coughing.

CV: Tachycardia, dysrhythmias, HTN, pulmonary edema (CHF).

Skin: Cyanosis, coolness, pallor, diaphoresis.

MS: Weakness, lethargy, fatigue, exhaustion, bolt upright or tripod position to facilitate breathing.

Collaborative Management

- Assess Pt for signs associated with allergic reaction.
- $\text{SpO}_2 < 90\%$ is considered abnormal and may require immediate intervention, but some Pts (e.g., Pts with COPD) can maintain a baseline SpO_2 of 88%–89% and are considered stable. These Pts depend on increased levels of CO_2 in order to maintain their respiratory drive. Use oxygen judiciously when administering supplemental oxygen in presence of COPD, because excessive amounts may actually decrease Pt's respiratory drive and inevitably cause clinical situation to progress to full respiratory arrest.
- If Pt is exhibiting signs of inadequate oxygenation (e.g., AMS, cyanosis) or $\text{RR} < 8$ breaths/minute, consider inserting nasopharyngeal airway and provide manual ventilations.
- Suction oropharynx and clear secretions as needed.
- If Pt is hyperventilating, encourage slow, deep breathing.
- Obtain focused medical history including recent surgeries and injuries.
- Complete a focused respiratory assessment.
- Administer STAT medication (breathing treatments, etc.) as ordered.

Seizure

Clinical Findings

Neuro: Loss of consciousness (blank stare if petit mal seizure).

Resp: Inability to breathe adequately, apnea.

Skin: Cyanosis, cool and moist, or warm and flushed.

MS: Repetitive jerking movements of upper and lower extremities, blinking, deviation of eyes and/or tongue.

GI/GU: Urinary or fecal incontinence.

Progression of a Seizure

- **Aura (before the seizure starts):** An auditory or sensory warning or recognition by Pt that seizure is imminent.
- **Ictal phase (active seizing):** Tonic posturing or clonic jerking.
- **Postictal phase (after the seizure has subsided):** AMS, extreme confusion, fatigue, fear, and disorientation.

Collaborative Management

- Protect Pt from injury by clearing immediate area of potential hazards (e.g., tables, chairs) and call for help. If Pt is in bed, raise side rails, place pillows between Pt and rails and then call for help.
- If Pt is out of bed, assist Pt to floor and call for help.
- If Pt is found on floor, anticipate possible spinal injury, and take cervical spine precautions, but do not attempt to restrain Pt forcefully during seizure.
- Position Pt (if able) in lateral recumbent position to help minimize risk of aspiration, and suction oropharynx to clear secretions as needed.
- Stay with Pt, and do not insert any objects into Pt's mouth.
- Administer STAT anticonvulsant medication as ordered.
- Assess ABCs and LOC once seizure has subsided.
- Obtain STAT bedside blood glucose level.
- If seizure likely to recur, install seizure pads on side rails to minimize injury.
- Reorient Pt, provide reassurance, and allow Pt to sleep.
- Document type of seizure and duration.

Shock—Comparing Different Types and Management

	Anaphylactic (allergic reaction)	Cardiogenic (pump failure)	Hypovolemic (low volume)	Neurogenic (spinal shock)	Septic (septicemia)
Clinical Findings	Dyspnea Bronchospasm Hives, rash Cool, pale skin ↓ BP, ↑ HR Diaphoresis Hypotension Edema, swelling	↓ HR, ↓ BP Weak pulses ↑ Cap refill Cyanosis Dysrhythmias Dyspnea AMS Cool, moist skin	↓ BP, ↑ HR Weak pulses ↑ Cap refill Cyanosis Dysrhythmias AMS Cool, moist skin	↓ BP, ↓ HR Bounding pulse Pale, warm, and dry skin Skin may be flushed	flushed, warm skin ↑ temp, ↓ UO (late) Vasodilatation (early) Vasoconstriction (late)
Collaborative Management	Support ABCs SC epinephrine Antihistamines IV fluids Corticosteroids	Support ABCs CPAP Fluid challenge (250–500 mL) if lungs clear Adjust IV to TKO for pulmonary congestion (rales or crackles) Vasopressors	Support ABCs Control bleeding Immobilize c-spine for trauma. Elevate legs (unless trauma)	Support ABCs Immobilize c-spine for trauma IV fluids Supine position Vasopressors	Support ABCs IV fluids Blood cultures Antibiotics Vasopressors

Suicidal/Combative Patients

- Ensure safety of yourself and staff.
- Be aware of items or medical equipment that may be used as a weapon.
- Observe Pt closely for signs of potential violence (e.g., threatening posture, agitation, threatening language, fist clenching, wide-eyed stare, etc.).
- Observe pupils (dilated = CNS ↑; constricted = CNS ↓).
- Demonstrate confidence, but avoid arguing or confrontation.
- Maintain a safe distance between yourself and Pt.
- Never allow the Pt to block your exits.
- Restrain Pts who are danger to themselves or others.

Tachycardia

Clinical Findings

Neuro: Dizziness, lightheaded, anxiety, AMS, restlessness.

Resp: Shortness of breath, hyperventilation.

CV: HR >100 beats/minute, chest discomfort, palpitations, dysrhythmias.

Skin: Cool and moist, warm and flushed, tingling sensation.

GI/GU: Nausea and vomiting.

MS: Weakness, fatigue.

Collaborative Management

- **Note:** If Pt is exhibiting signs of unstable tachycardia (CP, shortness of breath, AMS, hypotension, cyanosis), call code/notify physician STAT and refer immediately to Unstable Tachycardia in ACLS.
- If tachycardia results from anxiety or agitation, reduce external stressors (e.g., noise and bright lights, pain management, adjust room temperature).
- Lay Pt flat and elevate foot of bed 10°–15° if lightheaded or faint.
- Order stat 12-lead ECG; if Pt is monitored, assess ECG rhythm.
- Assess for associated symptoms (CP, respiratory distress, cyanosis, AMS).
- Obtain and document orthostatic vital signs (each set, 1 minute apart) from supine, sitting, and standing positions. Note: An increase in HR or decrease in SBP by 20 points from baseline is positive for orthostatic hypotension.

**Transfusion Reaction****Clinical Findings**

Neuro: Anxiety, restlessness.

Resp: Shortness of breath, dyspnea, tachypnea, bronchospasm.

CV: Chest pain, tachycardia, hypotension.

Skin: Urticaria, pruritus, erythema, burning at infusion site.

GI/GU: Nausea, vomiting, diarrhea, hematuria, oliguria, anuria.

MS: Flank, back, or joint pain.

Metabolic: Fever, chills.

Collaborative Management

- Stop transfusion and run **normal saline** to maintain IV access.
Note: LR contains calcium and will clot blood in the tubing.
- Notify physician and blood bank of reaction STAT.
- Recheck Pt ID and blood labels for possible errors.
- Return unused blood product to blood bank for analysis.
- Administer ordered medications (see specific reaction).
- Assess urinary catheter for output, color and clarity of urine. If Pt does not have urinary catheter in place, prepare to insert one for monitoring UO.
- Continue IV fluids to maintain minimum UO of 30 mL/hour.
- Monitor for early detection of any hemodynamic instability, (e.g., dysrhythmias, abnormal lab values, CHF).

Reaction-Specific Treatments**Anaphylactic Reaction**

- Support airway, breathing, and circulation as indicated.
- Administer epinephrine, antihistamines, and corticosteroids.
- Maintain intravascular volume.

Hemolytic Reaction

- Maintain renal perfusion with aggressive fluid resuscitation.
- Consider furosemide to increase renal blood flow.
- Consider low-dose dopamine to improve renal blood flow.
- Maintain urine output at 30–100 mL/hour.

Febrile, Nonhemolytic Reaction

- Treat fever with acetaminophen.
- If Pt develops chills, cover with blanket unless temp is $>102^{\circ}\text{F}$.

Trauma

Primary Trauma Survey

Airway Management and Cervical Spine Immobilization

- Open airway: Use jaw-thrust method, assign c-spine control.
- Assess for compromise/obstruction.
- Suction airway to clear blood, secretions, debris.
- Have c-collar applied.

Breathing and Ventilation

- Respirations—presence, rate, depth, quality, and effort.
- Inspect and palpate chest and auscultate lung fields for diminished or absent breath sounds.
- Manually ventilate with a BVM if breathing inadequate.

Circulation and Hemorrhage CONTROL

- Pulse—presence, quality, regularity.
- Begin chest compressions if no palpable pulse.
- Skin—color, temperature, moisture, capillary refill.
- Control hemorrhage with direct pressure.

Disability

- Determine and establish baseline GCS score.
- Pupils—PEARL (pupils equal and reactive to light).

Expose/Environment

- Remove clothing and assess Pt for injury and hemorrhage.
- Maintain body temperature by keeping Pt covered.
- Logroll to inspect and palpate posterior surfaces.
- Immobilize entire body using c-spine collar/long board.

Secondary Trauma Survey

Vital Signs

- BP, HR, RR, lung sounds, skin color, and temperature.
- Assess every 3–5 minutes or with any change in Pt status.

SAMPLE History

- Signs and symptoms.
- Allergies or sensitivities to medications.
- Medication (prescription or OTC) taken on a regular basis.

- Past medical or surgical history.
- Last meal eaten or last beverage.
- Events leading up to the injury.

Head-to-Toe Assessment

Head and Face

- Pupils—reassess equality and reactivity to light (PEARL).
- Contusions, abrasions, lacerations, asymmetry.
- Abnormalities of the eyes, eyelids, ears, mouth, mandible.
- Soft tissue injuries, skull depressions, abnormal mobility.

Neck and Cervical Spine

- Contusions, abrasions, lacerations, deformity.
- Tracheal deviation/JVD (jugular vein distention).
- Tenderness, crepitus, subcutaneous emphysema.

Chest and Lungs

- Contusions, abrasions, lacerations, deformity, paradoxical movement, penetrating or sucking chest wounds, splinting, guarding, sternal retractions, steering wheel bruises.
- Anterior lung fields—diminished/absent breath sounds.
- Tenderness, crepitus, subcutaneous emphysema.

Abdomen

- Distention, contusions, abrasions, lacerations, penetrations, ecchymosis, transverse umbilical contusion (seat belt sign).
- All quadrants—tenderness, guarding, softness, rigidity.

Pelvis and Perineum

- Contusions, abrasions, lacerations, hematoma, ecchymosis.
- Perineal injury/bleeding.
- Pelvic tenderness/instability/limb foreshortening.
- Pelvic fracture—shortened, externally rotated leg.

Back (performed during logroll onto long board)

- Contusions, abrasions, lacerations, penetrations, deformity.
- Spinal tenderness/deformity.
- Posterior lung fields—diminished/absent breath sounds.

Extremities

- Deformity, open fractures, dislocation, lacerations, hematoma, ecchymosis, tenderness, crepitus, abnormal movement.
- Six Ps: **Pain—Pallor—Pulse—Polar—Paresthesia—Paralysis.**
- Distal CSM—assess before and after splinting.

Neurological Status

- Reassess GCS score, pupils and sensory and motor function every 3–5 minutes or with any change in Pt status.

Special Considerations**Pregnancy**

- Immobilize pregnant women (>24 wk) in the left lateral position if possible to avoid compression of the vena cava.

Mechanism of Injury

- **Motor vehicle accidents (MVA):** Direction of impact, speed, condition of vehicle, use of seat belts or air bags, ejection from vehicle, was another passenger from same vehicle killed, delayed transport due to extrication.
- **Falls:** From what height and onto what type of surface?
- **Penetrating trauma:** Weapon, site and depth of injury, underlying organs, caliber/velocity of bullet, associated exit wounds.

Indications for Spinal Immobilization**Neurological Findings**

- AMS, GCS <15, unequal or unresponsive pupil(s).
- Loss of consciousness or loss of memory of incident.
- Neurological deficits/symptoms.

Associated Findings

- Spinal tenderness and/or spinal deformity.
- Distracting injury.
- Communication barrier.
- Alcohol or drug involvement.

Mechanism of Injury

- Fall >10 feet.
- Auto versus pedestrian.
- Penetrating injuries of head, chest, back, abdomen, pelvis.
- Significant blunt force trauma to the head, neck or back.

Revised Trauma Score (RTS)

Respiratory Rate	10–29/min	4	
	>29/min	3	
	6–9/min	2	
	1–5/min	1	
	Apnea	0	
SBP	>89	4	
	76–89	3	
	50–75	2	
	1–49	1	
	Pulseless	0	
GCS Score (see page 44)	13–15	4	
	9–12	3	
	6–8	2	
	4–5	1	
	3	0	
Total			

Basic Trauma Management

- Establish and manage ABCs with full c-spine precautions.
- Administer high-flow O₂ or assist ventilations manually.
- Control external bleeding with direct pressure.
- Maintain normal body temperature.
- Assess need for advanced airway and intubate as indicated.
- Start two large-bore IVs titrated to SBP >90 mm Hg.
- Attach ECG monitor and manage dysrhythmias.
- Determine need for transfer to appropriate trauma center.

Head Trauma

Watch for abnormal respiratory patterns, changes in LOC and pupils, s/s of increasing ICP, seizures, and posturing.

- Assess pupils and establish a baseline AVPU or GCS.
- Inspect ears for blood and CSF leak; allow nosebleed to drain if CSF leak is present—protect airway and suction as needed.
- Check blood glucose level with all AMS.

Chest Trauma

Watch for respiratory distress, shock, JVD, sub-Q emphysema.

- **Flail chest:** Unstable segment of ribs, paradoxical movement with respiration—stabilize flail segment with bulky dressing.
- **Impaled object:** Stabilize in place with 4×4 and tape. Do not remove object unless it interferes with resuscitation.
- **Open/sucking chest wound:** Three-sided, occlusive dressing—if tension pneumothorax develops, remove dressing.
- **Tension pneumothorax:** Respiratory distress, absent breath sounds on affected side, and/or tracheal deviation. Definitive care includes immediate needle decompression on affected side.

Comparing Types of Chest Trauma

	Pneumothorax	Hemothorax	Tamponade
Impression	Respiratory distress		Shock
Heart	Normal sound	Can be muffled	Muffled
Lungs	Diminished on affected side		Normal
Trachea	Shifted away	May be shifted	Midline
Neck Veins	Distended	Distended	Distended
Percussion	Hyperresonant	Dull	Normal

Abdominal Trauma

Watch for guarding, bruising, rigidity, distention, or hypotension. Anticipate internal hemorrhage.

Impaled Objects

- Secure in place with 4x4 and tape.
- Do not remove object unless it interferes with resuscitation.

Eviscerations

- Cover with saline-soaked, sterile gauze dressing.
- Do not inflate abdominal compartment if using PASG.
- Do not replace organs back into abdominal cavity.

Extremity Trauma

- Immobilize extremity in place.
- Assess distal CSM (circulation, sensory and motor function) before and after immobilization. Leave fingertips and toes exposed.
- Do not attempt to reduce fractures.
- Cover any exposed bone with saline-soaked sterile gauze dressing.
- Apply traction splint to mid-shaft femur fractures.
- Paramedics may apply pneumatic antishock garment (PASG) in the field to splint lower extremity fractures (use varies by region).
- Consider **morphine** (2–4 mg IV) or **fentanyl** (25–50 mcg IV) for moderate to severe pain (for isolated extremity injury only).
- Pt meets criteria for critical trauma with two or more long-bone fractures or any amputation proximal to wrist or ankle.

Amputations

- **Manage life-threatening injuries first!**
- Irrigate debris from amputated part with saline.
- Wrap part in gauze moistened with saline (avoid soaking gauze, which causes tissue to macerate and diminishes viability (especially digits)).
- Place wrapped part into a zip-lock bag (note time on bag) and then place sealed bag into a container of ice water.
- Immobilize partial amputations in anatomical position.

Abuse

Child Abuse/Neglect

- Unlikely mechanism of injury (story doesn't match injury).
- Details of injury change from person to person.
- Burns (scalding or cigarettes) or wire marks.
- Fractures or dislocations in a child less than 2 years old.
- Multiple injuries in various stages of healing.
- Unexcused delay in seeking medical attention.
- History is inconsistent with child's developmental stages.
- Overly protective parent (interferes with assessment).
- Unusual fear of parent or desire to please parent.
- Withdrawn or aggressive behavior.
- Malnutrition, insect infestation, or disheveled appearance.

NCLEX Elder Abuse/Neglect

- Malnourishment and unexplained dehydration.
- Poor hygiene (body/clothing soiled with urine and feces).
- Clothing inappropriate for weather/season.
- Inappropriate use of restraints (bruising/abrasions of wrists and ankles).

Abusive Partner

- Often, battered partners will minimize injuries or seriousness of situation.
- Repeated visits to ED with increasing severity of injuries.
- Overprotective partner—refuses to leave Pt alone with staff.
- Signs of trauma consistent with being physically and sexually assaulted.

Sexual Abuse (Child Molestation)

- Bruised or bleeding genitalia or blood-stained underwear.
- Painful urination or itching of genital area.
- STD (sexually transmitted disease) or pregnancy.
- Inappropriate display of sexual behavior.

Collaborative Management

- Remove victim from abusive environment.
- Avoid any confrontation with alleged abuser.
- Avoid examining genitalia except to control hemorrhage.
- Sexual assault victims should be seen at a facility with staff trained and equipped for examining and collecting sexual assault evidence and should not bathe, douche, urinate, or change clothes prior to being examined.
- Notify appropriate authorities or protective services when abuse suspected.

Bites and Stings**Emergency Management for All Pts**

- Follow standard protocol for supporting ABCs.
- Carefully remove any remaining, visible venom apparatus.
- Keep Pt warm, calm and avoid excessive movement.
- Apply cold compress/sterile dressing to affected area.
- Remove rings and constricting jewelry from affected area.
- Immobilize extremity with loose splint to restrict movement.

- Keep affected area below level of heart.
- Attempt to identify insect or animal for correct antidote.
- Manage allergic reaction/anaphylaxis (see pg 148).

Arachnid (Spiders) and Scorpions

Black widow

- **Classic presentation:** Abdominal rigidity and pain, HA, dizziness, shoulder and backache, n/v, sweating, and salivation.
- Increased morbidity and mortality in very young children and the elderly.

Brown recluse

- Spider identified by a violin-shaped pattern on back.
- **Taletell sign:** Reddish ulcer surrounded by a whitish-blue “bull’s eye.”
- Other than an inconspicuous bite mark, s/s usually won’t show for 24 hours.

Scorpion

- Bark scorpion (SW USA) is the only lethal species in the United States.
- Anticipate shock—support ABCs.

Hymenoptera (Bees, Wasps, and Ants)

- **Remove stingers by scraping only!** Avoid tweezers, squeezing venom sac will only inject more venom.
- If Pt has Epi-Pen, assist with administration.

Snake Envenomation

- Anticipate shock—support ABCs.
- Avoid practices such as tourniquets or excision and suction.
- **Do not use cold compresses or ice on affected area.**

Marine Animals

Jelly Fish/Sea Anemones (Tentacles)

- Carefully remove visible tentacles or spines. Irrigate skin with 5% acetic acid (household vinegar), isopropanol, or seawater. **Do not use fresh water.**

Sea Urchin/Sea Cucumber/Stingray (Barbs and Spines)

- Carefully remove spines if possible and immerse affected area in water as warm as Pt can tolerate without scalding (<110°F/42°C).

Burn Injury

Degree	Burn Depth/Penetration	Appearance
First	Epidermis only	Sunburn-like, no blistering
Second	Epidermis + partial dermis	Blistering
Third	Dermis + underlying tissue (full thickness)	Eschar and/or whitish-gray appearance

Burn Assessment

- TBSA (total body surface area): count only 2nd- and 3rd-degree burns.
- Age of Pt (age + TBSA = % probability of mortality).
- Pulmonary injury (smoke inhalation, toxic fumes).
- Associated injuries (airway burns and other trauma).
- Chemical/electrical burns, carbon monoxide poisoning.
- Preexisting diseases (potential for exacerbation).

Collaborative Management

- Anticipate laryngospasm/airway complications.
- Anticipate and prepare for transfer to a burn center.
- Initiate fluid resuscitation as ordered.

Fluid Resuscitation—First 24 hours (start from time of injury)

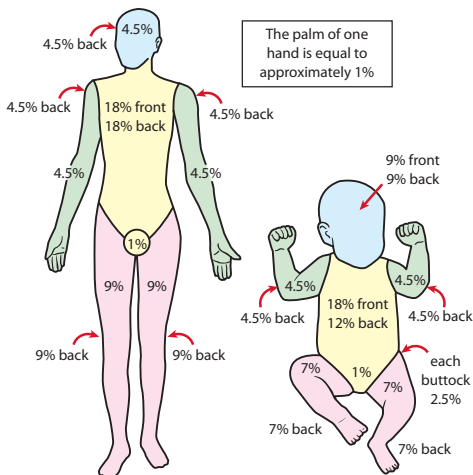
Indications

- Adults with 2nd- or 3rd-degree burns >20% of TBSA.
- Children >1 yr with 2nd- or 3rd-degree burns \geq 15% of TBSA.
- All infants with 2nd- or 3rd-degree burns \geq 10% of TBSA.

NCLEX Management (Parkland Formula)

- 4 mL \times kg \times %TBSA burned (2nd-degree plus 3rd-degree burn injury).
- Infuse half over the first 8 hours (from time of burn).
- Infuse the remaining half over the next 16 hours.

NCLEX



Cold Injury—Frostbite

Clinical Findings

General: White, waxy, mottled appearance, loss of sensation.

First-degree: Erythema, edema, waxy, hard white plaques.

Second-degree: Formation of clear blisters within 24 hours.

Third-degree: Formation of blood-filled blisters.

Fourth-degree: Full-thickness (muscle, tendons, and bones).

Thawing: Red, warm, edema, burning, stinging, painful.

Collaborative Management

- Remove Pt from cold environment.
- Remove wet clothing and protect Pt from further heat loss or hypothermia.
- Anticipate and manage hypothermia per protocol.

- Avoid excessive or rough handling of Pt or affected area.
- Do not massage frostbitten area.
- Leave blisters intact.
- Remove jewelry and keep affected area slightly elevated.
- For first-degree injury—position Pt with affected area against warm body surface (e.g., placing frostbitten fingers into the axilla).
- Encourage warm, nonalcoholic beverage unless AMS or trauma present.
- Monitor ECG and manage dysrhythmias per hypothermia protocol.
- Obtain IV access in a nonfrostbitten extremity.
- Consider **Morphine** 1–4 mg IV or **Fentanyl** 25–50 mcg IV for pain.

Rapid Thawing Procedure

- Caution: avoid thawing procedures if refreezing is likely.
- Submerge affected area in warm water (38–42°C/102–108°F) for 10–30 minutes (may use warm wet packs).
- Carefully separate digits with cotton or gauze.
- Elevate extremity slightly to minimize swelling.
- Manage pain as needed.

Drowning—Near Drowning—Submersion

Collaborative Management

- Bathtub and bucket drowning—consider child abuse.
- Note length of time Pt in water, water temp, and whether fresh or salt water.
- Obtain quick history (diving or boating accident, alcohol, etc.).
- Establish and manage ABCs per protocol.
- Administer high-flow O₂ via NRB mask or provide positive-pressure ventilations (PPV) or CPAP if indicated.
- Remove wet garments and protect Pt against further heat loss.
- Anticipate and manage hypothermia and associated traumatic injuries.
- Attach ECG monitor and manage dysrhythmias per ACLS.

Special Considerations

Cold water submersion: A Pt's chance of survival may increase significantly if the submersion-event occurs in cold water; therefore, resuscitation should continue while aggressive attempts are implemented to restore normal core temperature. Withhold drugs until core temperature is >30°C.

Scuba Diving—Decompression Sickness (DCS)

- **S/S:** Joint pain, AMS, fatigue, visual disturbances, increased RR and HR, hypotension, n/v, cyanosis, and seizure activity.
- Manage ABCs normally.
- Do not place Pt in Trendelenburg position (increases ICP).
- Transfer to facility with hyperbaric oxygen capabilities.
- Consider aspirin for potential blood coagulation disorder.
- Needle chest decompression for tension pneumothorax.

High-Altitude Illness

Acute Mountain Sickness (AMS)

- Most common at or above 2500 meters (8200 ft).
- **S/S:** fatigue, lethargy, anorexia, n/v, insomnia, dizziness, increased HR or RR (progresses to HACE, see next section).
- **Management:** ABCs, O₂, descent, supportive care.

High Altitude Cerebral Edema (HACE)

- Most common at or above 4800 meters (15,750 ft).
- **S/S:** (severe AMS) Ataxia and/or an altered mental status in addition to any one of the signs of acute mountain sickness.
- **Management:** ABCs, immediate descent, O₂, hyperbaric therapy (Gamow Bag/Tent). Consider Decadron 8 mg IM, IV.

High Altitude Pulmonary Edema (HAPE)

- Most common at or above 4500 meters (14,760 ft).
- **S/S:** Dyspnea, shortness of breath, crackles, cyanosis, dry cough (progresses to pink, frothy sputum), tachycardia, tachypnea, mild fever.
- **Management:** ABCs, descent, O₂, CPAP, rewarming, hyperbaric therapy. Consider nifedipine 10 mg PO.
- Can also occur in residents of high-altitude areas who travel to low-altitude areas and then return to high altitude (re-ascent HAPE).

Hyperthermia

Differentiating Heatstroke and Heat Exhaustion

	Heatstroke	Heat Exhaustion
Core temp	>104°F (40°C)	<104°F (40°C)
Skin	Dry, hot, flushed (late) Can be moist (early on)	Profuse sweating
Neuro	Significant AMS	Fatigue, HA, agitation
S/S common to both	Tachypnea, nausea and vomiting, tachycardia, weakness, fatigue, dehydration, hypotension	

Collaborative Management

- Remove Pt from heat source and loosen or remove clothing.
- Establish and manage ABCs per protocol.
- Administer high-flow O₂ or manually ventilate as indicated.
- Obtain baseline VS including core temperature.
- Begin rapid cooling measures if indicated.
- Obtain finger-stick blood glucose level.
- Position supine with feet elevated if exhibiting s/s of shock.
- Attach ECG monitor and manage dysrhythmias per ACLS.
- Obtain IV access and bolus with 500–1000 mL of NS.

Rapid Cooling Measures

- Indicated for a core temperature >104°F (40°C).
- Remove clothing from Pt if not already done.
- Use a fan to increase airflow over disrobed Pt while misting with warm water (warm water helps to prevent shivering).
- Place ice packs to axilla and groin.
- Diazepam or lorazepam will help to suppress shivering.
- Caution: To avoid the risk of hypothermia, stop cooling measure after core temperature has reached 102°F (39°C).

Hypothermia

Initial Therapy for All Patients

- Establish and maintain ABCs per protocol.
- Remove wet garments and protect Pt against further heat loss.
- Monitor core temperature and cardiac rhythm.

- Monitor ECG for tachycardia (early), bradycardia (late) and J waves.
- Slowly warm with blankets and dry clothes.
- Offer warm liquids only if victim is alert.
- **DO NOT** give alcohol or caffeine!
- **DO NOT** warm victim too rapidly!

Patients Requiring CPR

Core temperature <30°C

- Begin CPR, withhold drugs, limit to one shock for VF/VT.

Core temperature >30°C

- Begin CPR, administer drugs as indicated, but spaced longer apart.

Frostbite Injuries

Clinical Findings

- Cold to touch, numbness, blisters, color may be white, gray, waxy or bluish.
- Gently remove any jewelry from frostbitten area.
- If medical help is significantly delayed, gently warm area by soaking in warm water (100°–105°F) until feeling returns.
- **DO NOT** thaw if chance of refreezing!
- **DO NOT** rub affected area or pop blisters!
- Cover with loose, dry, sterile bandage.
- Separate frostbitten toes and fingers with sterile gauze.

Hazmat/Weapons of Mass Destruction (WMD)

Type of Incident	Agency	Phone Number
Biological Agents	CDC 24-hr	770-488-7100
	USAMRIID	888-872-7443
Chemical/Hazmat	Chemtrec	800-424-9300
Radiation Release	REAC/TS	423-576-3131

General Hazmat Decontamination Guidelines

Protect yourself first!

Organophosphate (OPP)/Carbamate Exposure

- Remove from source and remove Pt's clothing and jewelry.
- Decontaminate with copious NS or water.
- **Atropine:** 2–5 mg (**Peds:** 0.05 mg/kg) IV, IM repeated every 3–5 minutes until signs of SLUDGEM resolve.
- **Pralidoxime* (2-PAM):** 600 mg IM or may infuse 1–2 grams over 15–30 minutes (**Peds:** 20–50 mg/kg IM or infuse over 15–30 minutes).
*Not recommended for carbamates!
- **Do not induce vomiting if substance ingested!** If Pt alert with gag reflex, give water 5 mL/kg (max 200 mL) PO.

Carbon Monoxide (CO) Exposure

- Remove from source and remove clothing.
- **High-flow oxygen.**
- Rapid transport for hyperbaric therapy.

Cyanide Exposure

- See Chemical and Nerve Agents page 179.
- Extricate Pt, remove clothing and jewelry, support ABCs.
- **Hydroxocobalamin:** 5 grams (**Peds:** 70 mg/kg) IV infused over 15 minutes or **Cyanide Antidote Kit** (see page 156).

Hydrocarbon (Methylene Chloride, Xylene) Exposure

- Common in inhalation (huffing/sniffing) of aerosol fumes.
- Remove from source and remove clothing.
- **Do not induce vomiting if substance ingested!**
- Decontaminate with copious NS or water.

Ammonia or Chlorine Exposure

- Remove from source and remove clothing.
- Decontaminate with copious NS or water.
- Manage pulmonary edema per standard protocol.

Caustic (Acids and Alkalis) Exposure

- Remove from source and remove clothing.
- **Solid (powder) corrosive:** Brush off dry particles.
- **Liquid corrosive:** Decontaminate with copious NS or water.
- **Do not induce vomiting if substance ingested!** If Pt alert with gag reflex, give water or milk: 200–300 mL (**Peds:** 15 mL/kg).

Biological Agents

Anthrax (Inhalation, Cutaneous)

- **S/S: Inhalation:** Initial flu-like symptoms—progresses to severe respiratory difficulty and shock. **Cutaneous:** Marked by a boil-like lesion that forms an ulcer with a black center.
- **Exposure risk: Low**—Inhalation anthrax cannot be transmitted from person to person (cutaneous anthrax can, but is rare).
- **Treatment:** Use standard precautions, support ABCs.

Botulism

- **S/S:** Progressive, descending muscle weakness that leads to full-body paralysis and respiratory failure, drooping eyelids, slurred speech, difficulty swallowing, dry mouth.
- **Exposure risk: None**—Not spread from person to person.
- **Treatment:** Use standard precautions, support ABCs. *Botulinum* antitoxin—prehospital use not recommended.

Hemorrhagic Fevers (Ebola, Hanta, Marburg, etc.)

- **S/S: Early**—High fever, HA, fatigue, abdominal pain. **Late**—Hematemesis, diarrhea, rash, bleeding mucous membranes.
- **Exposure risk: High**—Transmitted from person to person or from contaminated surface to person.
- **Treatment:** Use contact precautions, support ABCs. Antibiotics—doxycycline or ciprofloxacin given in hospital.

Plague

- **S/S:** Fever, cough, chest pain, hemoptysis
- **Exposure risk: High**—Pts are contagious until they have completed 72 hours of antibiotic treatment.
- **Treatment:** Use droplet precautions, support ABCs. Antibiotics—doxycycline or ciprofloxacin given in hospital.

Smallpox

- **S/S:** Skin lesions (pox)—more prominent on the head and extremities and lesions all appear to be of the same age (chicken pox is concentrated around the trunk and lesions appear to be in different stages of healing).
- **Exposure risk: High**—From onset of rash until lesions have scabbed over and fallen off (approximately 3 weeks).
- **Treatment:** Patient isolation, airborne/contact precautions, ABCs.

Chemical and Nerve Agents

Vesicants (Mustard Gas, Lewisite, Phosgene)

- **S/S:** Erythema, blistering, burning, itching and stinging of skin, tearing and burning of eyes, sore throat, productive cough, laryngitis, irritated, bloody nose, light sensitivity.
- **Exposure risk:** **High**—Avoid contact with agent or fumes.
- **Treatment:** Use maximum PPE, decontamination with copious water, support ABCs. **For lewisite** (severe cases), **BAL** (British anti-lewisite) is administered: 3 mg/kg deep IM.

Nerve Agents (Sarin, VX, Soman, Tabun)

- **S/S:** Salivation, Lacrimation, Urination, Defecation, GI upset, Emesis, Muscle twitching, as well as coma and seizures.
- **Exposure risk:** **High**—Avoid contact with agent or fumes.
- **Treatment:** Use maximum PPE, remove from source, remove clothing, decontaminate with copious water, and support ABCs aggressively and administer antidote.
- **Mark-I Kit: Atropine:** 2–5 mg (**Peds:** 0.05 mg/kg) IM every 3–5 minutes until signs of SLUDGEM resolve; **Pralidoxime (2-PAM):** 600 mg IM or may infuse 1–2 grams over 15–30 minutes (**Peds:** 20–50 mg/kg IM or infuse over 15–30 minutes).
- **Diazepam:** 5–10 mg (**Peds:** 0.2 mg/kg) IV for seizures.

Pulmonary Agents (Chlorine, Diphosgene, PFIB)

- **S/S:** Eye and nasal irritation, tearing, chest pressure, cough, choking, hemoptysis, rales, pulmonary edema.
- **Exposure risk:** **Low**—Avoid contact with agent or fumes.
- **Treatment:** Use standard precautions, remove from source, decontaminate with copious water, support ABCs.

Cyanide

- **S/S:** Gasping, flushing, faintness, sweating, confusion, HA, seizure, coma, respiratory/cardiac arrest (cyanosis is rare).
- **Exposure risk:** **Low**—Avoid contact with agent or fumes.
- **Treatment:** Remove from source, remove clothing, support ABCs aggressively and administer antidote.
- **Hydroxocobalamin:** 5 grams (**Peds:** 70 mg/kg) IV infused over 15 minutes or **Cyanide Antidote Kit** (see page 156).

Medication Administration

Medication Rights

- | | |
|--------------------|-----------------------|
| ■ Right Pt | ■ Right time |
| ■ Right medication | ■ Right route |
| ■ Right dose | ■ Right documentation |

Triple Check

1st: When obtaining medication from where it is stored.

2nd: Side-by-side comparison of medication and written order and MAR.

3rd: One last time after preparation, just before administration.

Aspirate (IM and SC Injections)

- Aspirating before injecting medication ensures needle is not in blood vessel.
- If blood aspirated, withdraw and discard syringe, and prepare new injection.

When Not to Aspirate

- When administering SC anticoagulants (e.g., heparin) or insulin.
- Entering a blood vessel is unlikely with SC injection.
- Manipulation of syringe during aspiration is more likely to cause bruising.
- Aspiration of anticoagulants increases risk of bleeding and bruising.

Assessment and Documentation

- Assessment needs vary and depend on route and medication.
- Assess Pt and record VS before and after giving drugs that may adversely affect RR, HR, BP, LOC, and blood glucose; monitor labs as indicated.
- Assess meds for their efficacy and adverse drug reaction (ADR).
- Verify allergies and assess for reactions to drugs not previously taken by Pt.
- Document drug, dose, route, time given, and time discontinued if applicable.
- Document Pt's response and any ADR.

Points to Remember

- Confirm MAR is up to date and question unclear medication orders.
- Confirm medication compatibility if Pt taking concurrent medications.
- Do not crush sustained-release or enteric-coated capsules or pills.
- Always use filter needle to withdraw medication from glass ampule (discard and replace filter needle with regular injection needle before injection).
- Use straw for liquid PO iron to prevent staining of Pt's teeth.

Medication Errors

Interventions

- Discontinue medication immediately.
- Assess for and treat symptoms of ADR.
- Ascertain whether Pt has known allergy to medication given in error.
- Notify physician of medication error, along with any ADR.

Documentation

- Complete appropriate documentation per hospital policy.
- Document on MAR and progress notes if indicated.
- Avoid using such phrases as "given in error."
- State facts only; document medication, dose, time, and route on MAR.
- In progress notes, document physician notified.
- If there was any ADR, include intervention and outcome.
- Do not indicate within progress notes that an incident report was filled out.

Prevention

- Always observe medication rights.
- Always triple-check all medications given.
- **NCLEX** Always confirm expiration date, strength, and route.
- **NCLEX** Always write out order; avoid using abbreviations or symbols.
- Always use commas for dosing units at or above 1,000.
- Always use adequate space between drug name, dose, and unit of measure.

- Always double-check dosage range with pharmacist.
- **NCLEX** Always have second nurse witness when mixing insulin and double-check dose and type of insulin you plan to administer.
- Always confirm dosage calculations and infusion pump programming.
- **NCLEX** Always clarify orders that are unclear or contain abbreviations.
- Always label all syringes and discard syringe immediately after use.
- If taking verbal order, ask prescriber to spell out drug name and dosage to avoid sound-alike confusion (e.g., hearing Cerebyx for Celebrex, or 50 for 15) and read back order to prescriber after you have written it in chart.
- Never borrow medications from other Pts.
- Never administer medication drawn up by another person.
- Never document medication until after it has been administered.
- Never begin new medications before order has been received in pharmacy, because this circumvents built-in checks that can detect potential error.
- Document immediately after administering any medication.
- Review each Pt's medications for:
 - Use without an indication
 - Contraindications
 - Improper drug selection
 - Overdose
 - Subtherapeutic dose
 - Medication duplication
 - Efficacy
 - Allergies, ADRs, and toxicity
 - Potential drug or food interactions
 - Weight changes requiring dosage adjustments
 - Appropriate duration of therapy
 - Adherence with prescribed medication therapy

High-Alert Medication Classes

- | | |
|--|--|
| <ul style="list-style-type: none"> ■ Adrenergic agonists/antagonists ■ Anesthetic agents ■ Cardioplegic solutions ■ Chemotherapeutic agents ■ Dextrose solutions >20% ■ Dialysis solutions ■ Epidural/intrathecal meds ■ Glycoprotein IIb and IIIa inhibitors ■ Hypoglycemic agents (oral) | <ul style="list-style-type: none"> ■ Inotropic meds ■ Liposomal forms of drugs ■ Moderate sedatives ■ Narcotics and opiates ■ Neuromuscular blocking agents ■ Radiocontrast agents ■ Thrombolytics and fibrinolytics ■ TPN solutions |
|--|--|

Specific High-Alert Medications

- Insulin (IV and SC)
- IV amiodarone
- IV calcium
- IV colchicine
- IV digoxin
- IV heparin
- IV lidocaine
- IV magnesium
- IV nitroprusside
- IV potassium
- Methotrexate
- Nesiritide
- Saline solutions >0.9%
- Warfarin

Joint Commission Official “Do Not Use” List • 2009

Do Not Use	Rationale	Use Instead
U (unit)	Mistaken for “0” (zero), the number “4” or “cc”	Write “unit”
IU (international unit)	Mistaken for “IV” (intravenous) or the number “10” (ten)	Write “international unit”
Q.D., QD, q.d., qd (daily) Q.O.D., QOD, q.o.d., qod (every other day)	Mistaken for each other Period after the Q mistaken for “I” and the “O” mistaken for “1”	Write “daily” Write “every other day”
Trailing zero (X.0 mg)* Lack of leading zero (.X mg)	Decimal point is missed	Write X mg Write 0.X mg
MS MSO ₄ and MgSO ₄	Confused for one another Can mean morphine sulfate or magnesium sulfate	Write “morphine sulfate” Write “magnesium sulfate”

***Exception:** A “trailing zero” may be used only where required to demonstrate level of precision of value being reported (e.g., catheter tube sizes). It may not be used in medication-related documentation.

Additional Abbreviations, Acronyms and Symbols

(For possible future inclusion in the official “Do Not Use” List)

Continued

Do Not Use	Rationale	Use Instead
> (greater than) < (less than)	Misinterpreted as the number "7" (seven) or the letter "L" Confused with one another	Write "greater than" Write "less than"
Abbreviated drug names	Misinterpreted due to similar abbreviations for multiple drugs	Write drug names in full
Apothecary units	Unfamiliar with many practitioners Confused with metric units	Use metric units
@	Mistaken for the number "2" (two)	Write "at"
cc	Mistaken for "U" (units) when poorly written	Write "mL" or "ml" or "milliliters" ("mL" is preferred)
µg	Mistaken for mg (milligrams) resulting in 1000-fold overdose	Write "mcg" or "micrograms"

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Common Medication Formulas

IV Push (how much solution to draw up)	$\frac{(\text{Amount ordered} \times \text{Total volume})}{\text{Amount on hand}}$
Volume (e.g., 150 mL/hr)	$\frac{(\text{Volume per hour} \times \text{Drip set factor})}{\text{Time in minutes}}$
Dose (e.g., 20 mg/hr)	$\frac{(\text{Amount} \times \text{Weight} \times \text{Volume})}{\text{Total amount on hand}} \times \text{Drip set}$
Rate of existing IV	<ul style="list-style-type: none"> Count drops/minute and multiply by 60. Divide result by the drip factor being used.

IV Fluid Drip Rate Table (drops/minute)

Rate (mL/hr) →	TKO	50	75	100	125	150	175	200	250
10 gtt/mL set	5	8	13	17	21	25	29	33	42
12 gtt/mL set	6	10	15	20	25	30	35	40	50
15 gtt/mL set	8	13	19	25	31	37	44	50	62
20 gtt/mL set	10	17	25	33	42	50	58	67	83
60 gtt/mL set	30	50	75	100	125	150	175	200	250

Note: TKO is 30 mL/hr.

IV Solutions

IV solutions can be divided into two basic categories.

- **Crystalloids** contain water, dextrose and/or electrolytes and are commonly used to treat different fluid and electrolyte imbalances.
- **Volume expanders** (often referred to as colloids or plasma expanders) have an increased osmotic pressure in comparison with crystalloids; they remain in the intravascular space longer and are used for volume expansion.

NCLEX Crystalloids

Solution	Components	Indications
Saline solutions NS, 0.9% NaCl, sodium chloride, saline, 3% and 5% saline	Na and Cl.	<ul style="list-style-type: none"> • Alkalosis. • Fluid loss. • Sodium depletion.
Dextrose solutions D5W, D10W	Dextrose in water.	<ul style="list-style-type: none"> • Replace calories as carbohydrates. • Prevent dehydration. • Maintain water balance. • Promote sodium diuresis.

Continued

Solution	Components	Indications
Dextrose and saline mixtures D5NS, D5½NS, D10NS	Dextrose in saline.	<ul style="list-style-type: none"> • Promote diuresis. • Correct moderate fluid loss. • Prevent alkalosis. • Provide calories and sodium chloride.
Multielectrolyte solutions LR, Lactated Ringer's, Ringer's lactate, RL	Combination of Na, Cl, K, Ca, and lactate.	<ul style="list-style-type: none"> • Replace fluid lost from vomiting or GI suctioning. • Treat dehydration. • Restore normal fluid balance.

Volume Expanders (Colloids)

Volume expanders include albumin, dextran, and hetastarch. Often the term *colloid* is used to refer to all volume expanders.

- **Protein solutions:** Albumin, plasma, and commercial plasmas (e.g., Plasmanate).
- **Dextran:** Complex, synthetic sugar, metabolized slowly, does not stay in vascular space as long as a colloid.
- **Hetastarch:** Synthetic colloid that works similarly to Dextran.

Solution	Components	Indications
Albumin 5% and 25%	Human plasma protein.	<ul style="list-style-type: none"> • 5%—To expand volume and mobilize interstitial edema. • 25%—To treat hypoproteinemia.
Plasma Plasmanate and Plasma protein fraction (PPF)	Contains human plasma proteins in NS.	<ul style="list-style-type: none"> • To increase serum colloid osmotic pressure.
Dextran 40 and 70	Synthetic colloid made of glucose polysaccharides.	<ul style="list-style-type: none"> • To expand volume. • To mobilize interstitial edema.
Hetastarch Hespan	Synthetic colloid made from corn.	<ul style="list-style-type: none"> • To expand volume. • To mobilize interstitial edema.

Blood and Blood Products

Product	Components	Indications
Whole blood	Contains all blood products.	<ul style="list-style-type: none"> • Rarely used—may be given emergently to a hemorrhaging Pt.
Packed red blood cells (PRBCs)	No clotting factors or platelets, 80% plasma removed.	<ul style="list-style-type: none"> • Acute and chronic anemia, blood loss.
Platelets	Usually given in pools of 6–10 units.	<ul style="list-style-type: none"> • Increase low platelet counts or treat coagulopathies. • One unit will generally increase platelet count by 6000 units.
Fresh frozen plasma (FFP)	Plasma and clotting factors.	<ul style="list-style-type: none"> • Replace clotting factors, e.g., after multiple transfusions (>6 units PRBCs), or to reverse effects of Coumadin.
Cryoprecipitate	Clotting factors.	<ul style="list-style-type: none"> • To treat hemophilia, fibrinogen deficiency, DIC.

Blood Administration

General Guidelines

- Obtain informed consent (consider cultural and religious beliefs).
- Ascertain whether Pt has ever had a reaction to a previous transfusion.
- Use only 0.9% sodium chloride solution for blood administration.
- An 18- to 19-gauge catheter is preferred for maximum flow rate and minimal damage to RBCs (smaller catheters may result in blood diluted with saline).
- Use only approved blood administration tubing with an inline blood filter.
- Never add medications to blood transfusions (a separate line must be used).

- Document beginning volume of each blood bag transfused (volume varies).
- Transfusions should not exceed 4 hours to reduce risk of septicemia.
- Change administration tubing every 4–6 hours and after each unit of blood.
- Always check expiration date on blood bag.
- Inspect blood bag for damage, clots, leaks, discoloration and bubbles.
- Begin infusion within 30 minutes of receiving blood from blood bank. If infusion cannot be started within 30 minutes, blood must be returned immediately to blood bank for proper storage under monitored conditions.
- Begin transfusion slowly and remain with Pt for the first 15 minutes to assess for transfusion reaction. If no evidence of reaction, transfuse at ordered rate.
- Acetaminophen or diphenhydramine may be prescribed if Pt has a history of transfusion reaction (give PO form 30 minutes prior to beginning transfusion and give IV form immediately before beginning transfusion).

Patient Identification

- Two licensed nurses must verify that Pt's blood bank arm band number match information on blood bag label and blood bank form.
- Pt must state full name while nurse compares it to blood bank arm band.
- Confirm ABO and Rh compatibility by comparing blood bank arm band number with blood bag label and blood bank form.
- Notify blood bank immediately with any inconsistencies in identification.

Patient Assessment

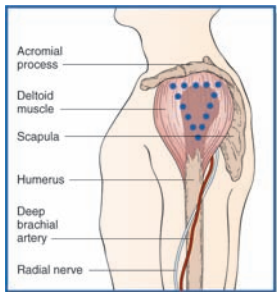
- Monitor VS, temperature, renal, circulatory and respiratory status before transfusion, within 15 minutes of beginning transfusion, and once every hour until 1 hour after completion of transfusion.
- Notify physician if Pt has fever prior to beginning transfusion.

NCLEX Blood Transfusion Reaction

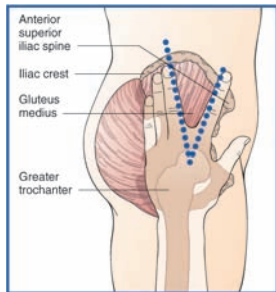
See Transfusion Reaction in EMERG/TRAUMA section.

Intramuscular (IM) Injection Sites

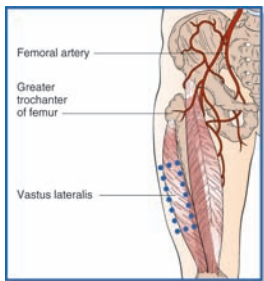
Deltoid Site



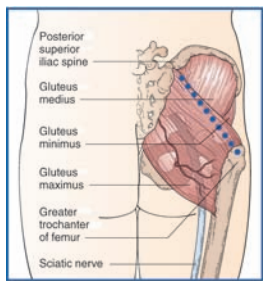
Ventrogluteal Site



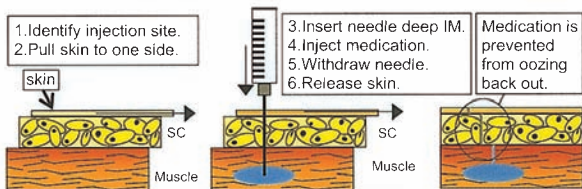
Vastus Lateralis Site



Dorsogluteal Site



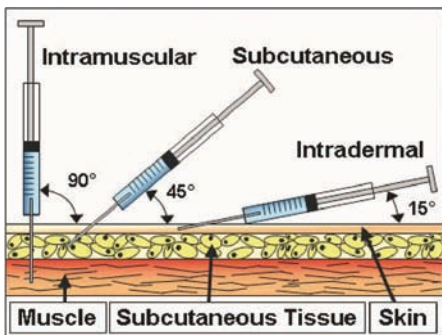
Z-Track Method for Giving IM Injections



Injections—Intradermal (ID), Subcutaneous (SC), and Intramuscular (IM)

	ID	SC	IM
Site	Inner forearm, chest, and back	Upper posterior arm, upper back, low back, anterior lateral thigh, and abdomen	Deltoid, ventrogluteal, vastus lateralis and dorsogluteal muscles
Gauge	27–30 g	25–28 g	23 g
Length	1/4–3/8"	3/8–5/8"	1–1 1/2"
Angle	10°–15°	90° or 45° for very thin patients	90°
Volume	0.1–0.2 mL	0.5–1 mL	Up to 3 mL; small muscles (deltoid) maximum 1 mL

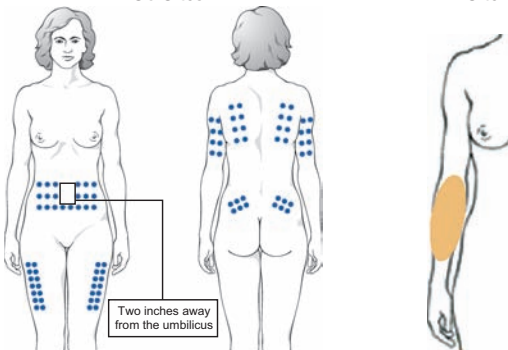
Angle of Injection

**NCLEX**

SC and ID Injection Sites

SC Sites

ID Site



SC Injection Technique

- Always observe medication rights and standard precautions.
- Select and cleanse appropriate sight with an alcohol swab.
- Don gloves and hold syringe in dominant hand.
- With nondominant hand, either pinch or spread skin.
- **Note:** If less than 1 inch can be pinched between fingers, pinch skin and insert needle at a 45° angle. If more than 1 inch can be pinched, spread skin and insert needle at a 90° angle.
- Insert needle to hub with one steady motion.
- Do not aspirate when administering heparin or insulin. Otherwise, aspirate to ensure needle is not in a blood vessel.
- Inject medication and withdraw needle.
- Massage site and cover with a Band-Aid (do not massage site when administering heparin).
- Discard equipment per facility guidelines.
- Document medication, dose, site of injection, and Pt's response.

NCLEX

Mixing Insulin

- Use only an insulin syringe.
- Insulin should not be diluted or mixed with other noninsulin medications.
- Withdraw enough air into insulin syringe that is equal to combined amount of total insulin to be given.
- Without actually dipping needle into NPH solution itself, pressurize NPH vial with an amount of air equal to amount of NPH to be mixed with regular insulin and then remove syringe; set NPH vial aside.
- Inject remaining air into regular insulin vial and then withdraw ordered amount of regular insulin into syringe.
- After withdrawing ordered amount of regular insulin, remove syringe and expel any air bubbles.
- Reinsert syringe into NPH vial (already pressurized) and withdraw ordered amount of NPH.

NCLEX Types of Insulin

	Onset	Peak	Duration
Rapid Acting			
insulin lispro (Humalog)	5 min	60–90 min	4–6 hours
insulin aspart (NovoLog)	10–20 min	1–3 hours	3–5 hours
Short Acting			
concentrated insulin: Iletin II regular, Insulin U-500. Do not administer IV because of potential for overdose.	30–60 min	2–3 hours	5–7 hours
regular insulin: (Humulin R, Insulin-Toronto, Novolin R, Iletin II Regular, Velosulin BR) Regular insulin is the only insulin that can be administered IV.	SC route: 30–60 min IV route: 10–30 min	SC route: 2–4 hours IV route: 15–30 min	SC route: 5–7 hours IV route: 30–60 min
Intermediate Acting			
isophane (NPH): (Humulin N, NPH Iletin II, Novolin Ge NPH, Novolin N)	1–2 hours	8–12 hours	18–24 hours
Long Acting			
insulin glargine (Lantus) Do not mix with other insulins; results may be unpredictable.	Onset: 1 hour. Provides a constant concentration over a 24-hour period with no pronounced peak.		
insulin detemir (Levemir)	2–4 hours	None	24 hours

Continued

	Onset	Peak	Duration
Mixed Insulins (other mixes are available)			
NPH/regular: (Humulin , 50/50 Humulin 70/30, Novolin 70/30)	30–60 min	2–8 hours	24 hours
aspart protamine/aspart (NovoLog Mix 70/30)	10–20 min	2 1/2 hours	24 hours
lispro protamine/lispro (Humalog Mix 75/25)	5 min	2 hours	22 hours

Intravenous Infusions and Maintenance

IV Piggyback (IVPB) Setup

- Confirm order and ensure bag is clearly labeled.
- Piggyback bag must be higher than primary IV bag. To do this, hang primary bag from an extension hook so that it is lower than the piggyback bag.
- Use most proximal access port on primary line.
- Adjust piggyback stopcock to desired rate.
- After infusion is complete, the primary IV bag will begin to drip again.
- Discard IVPB bag.
- Reconfirm that primary drip rate is correct.
- **Document:** Medication, infusion rate, date, and time.

Troubleshooting IV Complications

NCLEX Infiltration

- **Assessment:** Swelling, tenderness, decreased or no infusion rate, blanching of skin, and site is cool to touch.
- **Intervention:** D/C IV and restart in a new site. Apply warm compress to the affected area.

NCLEX Phlebitis

- **Assessment:** Classic sign is red line along course of vein. Other signs include redness, heat, swelling, and tenderness.
- **Intervention:** D/C IV and restart in a new site. Apply warm compress to the affected area.

Decreased or No Infusion Rate

- Assess IV site for infiltration.
- If IV insertion site is close to a joint, straighten extremity.
- Use a padded arm board to help maintain alignment.
- Inspect entire length of tubing for kinks or holes.
- Inspect stopcocks and other flow-control devices.
- Ensure that burette (pediatrics) contains correct amount of fluid.
- If not using an infusion pump, raise height of the IV bag.
- Attempt to flush with 3 mL of NS, but if a significant amount of resistance is encountered, notify IV therapy team or RN. If IV therapy is unavailable, discontinue IV and restart a new one, preferably on the opposite arm.

Pain at IV Site

- Assess IV site for infiltration, phlebitis, and irritation from tape.
- Ensure adequate stabilization of IV catheter.
- If IV insertion site is close to a joint, straighten extremity.
- Use a padded arm board to help maintain alignment.
- Consult the pharmacy or *Davis's Drug Guide* to ascertain if a medication being infused can cause pain or irritation.
- Notify the IV therapy team or RN if unsuccessful at relieving pain or discomfort.

Blood Backing Up Into IV Tubing

- Two common causes are allowing the IV bag to run dry (corrected by changing to a new bag) or hanging the IV bag at a level that is lower than either the IV insertion site or the Pt's heart (corrected by raising IV bag).
- Note: If bag is allowed to run dry, the tubing may fill with air. After changing to a new bag, the air in the tubing can be removed by inserting a large syringe into the port distal to the air and aspirating, as the tubing is re-primed.
- Occasionally, an artery is cannulated. If this is suspected, palpate for a pulse under the insertion site and inspect for pulsation of blood in the tubing (D/C IV and hold direct pressure for at least 5 minutes).

Leaking Fluid at IV Site

- Assess IV site for infiltration.
- Inspect connection between tubing and IV catheter.
- If all connections are patent, err on side of safety and assume that site is infiltrating, even if the IV is infusing freely. Call for an IV therapy consult.

Flushing Peripheral and Central Lines

Device	Solution (per lumen)	Frequency
Peripheral Vascular Access Device (VAD)		
Peripheral IV line	3–5 mL NS (0.9% NaCl)	Every 12 hours and after each use.
Midline catheter	5–10 mL NS followed with 1 mL heparin (10 units/mL)	Every 12 hours and after each use.
Peripherally Inserted Central Catheters (PICC)		
Groshong PICC	5–10 mL NS	Weekly and after each use.
Per-Q-Cath (pediatric VAD)	3–5 mL NS followed with 1 mL heparin (10 units/mL)	Every 12 hours and after each use.
Central Venous Catheters (CVC)		
Valve-tipped (no clamps)	5–10 mL NS	Weekly and after each use.
Open-ended (clamps)	3–5 mL NS followed with 1 mL heparin (10 units/mL)	Every 12 hours and after each use.
Implanted Port Catheters		
Groshong Port-A-Cath	5–10 mL NS followed with 1 mL heparin (100 units/mL)	Every 28 days and after each use.

Routine Care of Peripheral and Central Lines

- **Always verify heparin strength!** Heparin flushes are always done using either 10 or 100 units/mL and should never exceed 100 units/mL!
- **Clamps:** Open-ended catheters will always have clamps to prevent backflow of blood and air embolisms. All open-ended catheters must be flushed with heparin to minimize fibrin collection and clot formation.
- **No Clamps:** Valve-tip catheters do not have any clamps and require saline flushes—use positive-pressure flush technique.
- **End Caps:** Change end cap(s) every 7 days or sooner if any blood, cracks, or leaks are seen.
- **Syringe Size:** The smaller the syringe size, the greater the pressure in pounds per square inch (PSI); greater PSI increases potential for catheter damage. Use a 10-mL or greater syringe for all central-line flushes.
- **Positive-Pressure Flush:** To reduce potential for blood backflow into catheter tip, which promotes clot formation and catheter occlusion, always remove needles or needleless caps slowly while injecting last 0.5 mL of NS.

Intraosseous (IO) Access

Manual Insertion Technique

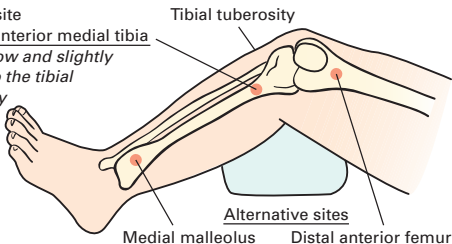
- Observe standard precautions and cleanse area with antiseptic.
- Flex and support knee with a sandbag or towel roll.
- Palpate tibial tuberosity (bony prominence just below knee).
- Locate insertion site (flat area ~ 2 cm distal and slightly medial to tibial tuberosity; the preferred insertion site).
- Stabilize leg using opposite hand (avoid path of needle).
- Insert IO needle at 90° angle to skin (slightly angled toward foot to avoid growth plate).
- Maintain constant pressure and advance IO needle using a twisting motion until you feel a “pop” and a cessation of resistance.
- Remove trocar and attach 10-mL syringe.
- Aspirate marrow (may or may not be successful).
- Attach connector and flush catheter with 10 mL of NS.
- Secure catheter and tubing and begin infusion.

- Monitor for signs of infiltration, including pain, swelling, inflammation, and leakage of fluid from IO site.
- D/C IO and apply pressure bandage if infiltration suspected.

Preferred site

Proximal anterior medial tibia

- 2 cm below and slightly medial to the tibial tuberosity



Intraosseous Driver (EZ IO™) Technique

- **Insertion site: Proximal anterior medial tibia only.**
- Stabilize leg using opposite hand (avoid path of needle).
- Gently power EZ IO needle at a 90° angle until you feel a “pop.”
- Remove driver from needle set, remove stylet from catheter and confirm catheter stability and placement in same manner as manual technique.

Pregnancy Risk Categories

Category A: Adequate, well-controlled studies in pregnant women have not shown an increased risk of fetal abnormalities.

Category B: (1) Animal studies show no adverse fetal effects, but there are no controlled human studies, or (2) animal studies show adverse fetal effect, but well-controlled human studies do not.

Category C: (1) Animal studies show adverse fetal effect, but there are no controlled human studies, or (2) no animal or well-controlled human studies have been conducted.

Category D: Well-controlled or observational human studies show positive evidence of human fetal risk. Maternal benefit may outweigh fetal risk in serious or life-threatening situations.

Category X: **Contraindicated.** Well-controlled or observational human and/or animal studies show positive evidence of serious fetal abnormalities. Fetal risks far outweigh maternal benefit.

General Chemistry

Note: Reference ranges vary between facilities. Always check normal reference ranges from your facility's laboratory.

Legend: d = day; m = month; y = year; M = male; F = female; μ = micro.

Note: (**bold, red font in parenthesis**) indicates critical level.

Lab	Conventional	SI Units
Albumin	<1y: 2.9–5.5 g/dL 1–40y: 3.7–5.1 g/dL 41–60y: 3.4–4.8 g/dL 61–90y: 3.2–4.6 g/dL >90y: 2.9–4.5 g/dL	29–55 g/L 37–51 g/L 34–48 g/L 32–46 g/L 29–45 g/L
Aldolase (ALD)	0–2y: 3.4–11.8 U/L 2–16y: 1.2–8.8 U/L Adult: <7.4 U/L	3.4–11.8 U/L 1.2–8.8 U/L <7.4 U/L
Alkaline phosphatase	M: 35–142 U/L F: 25–125 U/L	35–142 U/L 25–125 U/L
Ammonia	M: 27–102 mcg/dL F: 19–87 mcg/dL	19–73 μ mol/L 14–62 μ mol/L
Amylase<	30–110 U/mL	30–110 U/mL
Anion gap	8–16 mEq/L	8–16 mmol/L
AST (aspartate aminotransferase) Note: AST is formerly known as SGOT .	0–9d: 47–150 U/L 10d–23m: 9–80 U/L M 2–59y: 15–40 U/L M 60–90y: 19–48 U/L F 2–59y: 13–35 U/L F 60–90y: 9–36 U/L	47–150 U/L 9–80 U/L 15–40 U/L 19–48 U/L 13–35 U/L 9–36 U/L
Bilirubin, direct (conjugated)	<0.3 mg/dL	<5 μ mol/L
Bilirubin, indirect (unconjugated)	<1.1 mg/dL	<19 μ mol/L
Bilirubin, total (>15 mg/dL)	0–1d: 1.4–8.7 mg/dL 1–2d: 3.4–11.5 mg/dL 3–5d: 1.5–12.0 mg/dL >1m: 0.3–1.2 mg/dL	24–149 μ mol/L 58–97 μ mol/L 26–205 μ mol/L 5–21 μ mol/L

Continued

Lab	Conventional	SI Units
BUN (blood urea nitrogen) (>100 mg/dL) (nondialysis Pts)	0–3y: 5–17 mg/dL 4–13y: 7–17 mg/dL 14–90y: 8–21 mg/dL >90y: 10–31 mg/dL	1.8–6.0 mmol/L 2.5–6.0 mmol/L 2.9–7.5 mmol/L 3.6–11.1 mmol/L
Calcitonin	M: <19 pg/mL F: <14 pg/mL	<19 ng/L <14 ng/L
Calcium (Ca ⁺) (<7; >12 mg/dL)	3–12y: 8.8–10.8 mg/dL Adult: 8.2–10.2 mg/dL	2.20–2.70 mmol/L 2.05–2.55 mmol/L
Carbon dioxide (CO ₂) (<15; >40 mmol/L)	<2y: 13–29 mEq/L >2y: 23–39 mEq/L	13–29 mmol/L 23–29 mmol/L
Chloride (Cl ⁻) (<80; >115 mEq/L)	0–1m: 98–113 mEq/L >1m: 97–107 mEq/L	98–113 mmol/L 97–107 mmol/L
Cholesterol	<20y: <170 mg/dL >20y: <200 mg/dL	<4.4 mmol/L <5.18 mmol/L
Cortisol	AM: 5–25 mcg/dL PM: 3–16 mcg/dL	138–690 nmol/L 83–442 nmol/L
Creatine kinase (CK)	M: 50–204 U/L F: 36–160 U/L	50–204 U/L 36–160 U/L
Creatinine (>7.4 mg/dL)	1–5y: 0.3–0.5 mg/dL 6–10y: 0.5–0.8 mg/dL M >10y: 0.6–1.2 mg/dL F >10y: 0.5–1.1 mg/dL	27–44 μmol/L 44–71 μmol/L 53–106 μmol/L 44–97 μmol/L
Ferritin	M ≥16y: 20–250 ng/mL F 16–39y: 10–20 ng/mL F ≥40y: 12–263 ng/mL	20–250 mcg/L 10–20 mcg/L 12–263 mcg/L
Folate	>2.5 ng/mL	>5.7 nmol/L
Glucose (<40; >400 mg/dL)	1d: 40–60 mg/dL 2d–2y: 50–80 mg/dL Child: 60–100 mg/dL Adult: 65–99 mg/dL	2.2–3.3 mmol/L 2.8–4.4 mmol/L 3.3–5.6 mmol/L 3.6–5.5 mmol/L
HDL	Optimal: >60 mg/dL	0.9–1.56 mmol/L
Ionized calcium (<3.2; >6.2 mg/dL)	4.6–5.08 mg/dL	1.12–1.32 mmol/L
Iron (Fe) (>400 mcg/dL)	M: 65–175 mcg/dL F: 50–170 mcg/dL	11.6–31.3 μmol/L 9–30.4 μmol/L

Lab	Conventional	SI Units
Iron binding capacity, total (TIBC)	250–350 mcg/dL	45–63 μ mol/L
K ⁺ (Potassium) (<2.5; >6.5)	Child: 3.4–4.7 mEq/L Adult: 3.5–5.0 mEq/L	3.4–4.7 mmol/L 3.5–5.0 mmol/L
Lactic acid (≥ 31 mg/dL)	3–23 mg/dL	0.3–2.6 mmol/L
LDH (lactate dehydrogenase)	90–156 U/L	90–156 U/L
LDL	Optimal: <100 mg/dL	<2.59 mmol/L
Lipase	3–73 U/L	3–73 U/L
Magnesium (Mg ⁺⁺) (<1.2; >4.9 mg/dL)	Child: 1.7–2.1 mg/dL Adult: 1.6–2.6 mg/dL	0.70–0.86 mmol/L 0.66–1.07 mmol/L
Mg ⁺⁺ (magnesium) (<1.2; >4.9 mg/dL)	Child: 1.7–2.1 mg/dL Adult: 1.6–2.6 mg/dL	0.70–0.86 mmol/L 0.66–1.07 mmol/L
Na ⁺ (sodium) (<120; >160 mmol/L)	0–1y: 133–144 mEq/L >1y: 135–145 mEq/L	133–144 mmol/L 135–145 mmol/L
Osmolality (<265; >320 mOsm/kg)	275–295 mOsm/kg	275–295 mmol/kg
Phosphorus (<1 mg/dL)	2.5–4.5 mg/dL	0.8–1.4 mmol/L
Potassium (K ⁺) (<2.5; >6.5 mmol/L)	Child: 3.4–4.7 mEq/L Adult: 3.5–5.0 mEq/L	3.4–4.7 mmol/L 3.5–5.0 mmol/L
Prealbumin	12–42 mg/dL	120–420 mg/L
Protein, total	6–8 g/dL	60–80 g/L
PSA	<4 ng/mL	<4 mcg/L
Pyruvate kinase	9–22 IU/g hemoglobin	9–22 IU/g hemoglobin
Sodium (Na ⁺) (<120; >160 mmol/L)	0–1y: 133–144 mEq/L >1y: 135–145 mEq/L	133–144 mmol/L 135–145 mmol/L
T ₃ free (triiodothyronine)	260–480 pg/dL Gravid: 196–338 pg/dL	4–7.4 pmol/L 3–5.2 pmol/L
T ₃ total (triiodothyronine)	70–204 ng/dL Gravid: 116–247 ng/dL	1.08–3.14 nmol/L 1.79–3.8 nmol/L

Continued

Lab	Conventional	SI Units
T ₄ free (thyroxine)	0.8–1.5 ng/dL	10–19 pmol/L
T ₄ total (thyroxine) (<2 mcg/dL; >20 mcg/dL)	M: 4.6–10.5 mcg/dL F: 5.5–11 mcg/dL Gravid: 5.5–16 mcg/dL	59–135 nmol/L 71–142 nmol/L 71–155 nmol/L
Thyroglobulin	0–50 ng/mL	0–50 mcg/L
Triglycerides	<150 mg/dL	<1.7 mmol/L
TSH	0.4–4.2 μ IU/mL	0.4–4.2 μ IU/mL
Urea nitrogen (>100 mg/dL)	Child: 7–17 mg/dL Adult: 8–21 mg/dL	2.5–6.0 mmol/L 2.9–7.5 mmol/L
Uric acid	M: 4.4–7.6 mg/dL F: 2.3–6.6 mg/dL	0.26–0.45 mmol/L 0.14–0.39 mmol/L

Hematology (CBC With Differential)

Lab	Conventional	SI Units
Blood volume	8.5%–9.0% of body weight in kg	80–85 mL/kg
Red blood cell (RBC)	M: $4.71\text{--}5.14 \times 10^6$ cells/mm ³ F: $4.20\text{--}4.87 \times 10^6$ cells/mm ³	$4.71\text{--}5.14 \times 10^{12}$ cells/L $4.20\text{--}4.87 \times 10^{12}$ cells/L
Hemoglobin (Hgb) (<6; >18 g/dL)	M: 13.2–17.3 g/dL F: 11.7–15.5 g/dL	132–173 mmol/L 117–155 mmol/L
Hematocrit (Hct) (<18; >54%)	M: 43%–49% F: 38%–44%	0.43–0.49% 0.38–0.44%
Leukocytes (WBC) (<2500; >30,000/mm³)	$4.5\text{--}11 \times 10^3/\text{mm}^3$	$4.5\text{--}11 \times 10^9/\text{L}$
• Neutrophils	59%	0.59
• Bands	3.0%	0.03
• Segments	56%	0.56
• Lymphocytes	34%	0.34
• Monocytes	4.0%	0.04

Lab	Conventional	SI Units
• Eosinophils	2.7%	0.027
• Basophils	0.5%	0.005
Platelets (<20,000; >1,000,000)	150,000–450,000/mm ³	150–450 x 10 ⁹ /L
ESR (erythrocyte sedimentation rate)	M 0–49y: 0–15 mm/hr M >49y: 0–20 mm/hr F 0–49y: 0–25 mm/hr F >49y: 0–30 mm/hr	0–15 mm/hr 0–20 mm/hr 0–25 mm/hr 0–30 mm/hr

Cardiac Markers

Lab	Conventional	SI Units
CK (total)	M: 50–204 U/L F: 36–160 U/L	50–204 U/L 36–160 U/L
CK–MB	0–3 ng/mL	0–3 ng/mL
LDH	90–156 U/L	90–156 U/L
Myoglobin	5–70 mcg/L	5–70 mcg/L
Troponin-I (>0.5 ng/mL)	<0.35 ng/mL	<0.35 ng/mL
Troponin-T	<0.20 mcg/mL	<0.20 mcg/mL

Progression of Cardiac Markers

Lab	Onset	Peak	Duration
AST (SGOT)	6–8 hr	12–48 hr	3–4 days
CK (total)	4–6 hr	24 hr	2–3 days
CK–MB	4–6 hr	15–20 hr	2–3 days
LDH	12 hr	24–48 hr	10–14 days
Myoglobin	1–3 hr	4–12 hr	1 day
Troponin-I	2–6 hr	15–20 hr	5–7 days
Troponin-T	3–5 hr	24 hr	10–15 days

Coagulation

Lab	Conventional	SI Units
ACT	90–130 sec	90–130 sec
aPTT (activated) (>70 sec)	25–39 sec	25–39 sec
Bleeding time (>14 min)	2–7 min	2–7 min
Fibrinogen (<80 mg/dL)	200–400 mg/dL	2–4 g/L
INR (>5)	Normal: <2 Target therapeutic: 2–3	<2 2–3
Plasminogen	80%–120% of normal	80%–120% of normal
Platelets (<20,000; >1,000,000)	150,000–450,000/mm ³	150–450 x 10 ⁹ /L
PT (prothrombin time) (>27 sec)	10–13 sec	10–13 sec
Thrombin time	11–15 sec	11–15 sec

DIC Panel (Disseminated Intravascular Coagulopathy)

Lab	Conventional	SI Units
aPTT (activated) (>70 sec)	25–39 sec	25–39 sec
PT (prothrombin time) (>27 sec)	10–13 sec	10–13 sec
Fibrinogen (<80 mg/dL)	200–400 mg/dL	2–4 g/L
Thrombin time	11–15 sec	11–15 sec
D-Dimer	<300 ng/mL	<300 ng/mL

Medication Levels (Therapeutic)

Medication	Conventional	Critical/Toxic	SI Units
Acetaminophen	10–30 mcg/mL	After 4 hr: >150 After 12 hr: >50	66–199 µmol/L
Amiodarone	0.5–2.0 mg/L	>2	
Carbamazepine	4–12 mcg/mL	>12	17–51 µmol/L
Digoxin	0.5–2.0 ng/mL	>2.5	0.6–2.6 nmol/L
Lidocaine	1.5–5.0 mcg/mL	>6	6.4–21.4 µmol/L
Lithium	0.6–1.4 mEq/L	>1.5	0.6–1.4 mEq/L
Nitroprusside	<10 mg/dL	>10	
Phenobarbital	15–40 mcg/mL	>40	65–172 µmol/L
Phenytoin	10–20 mcg/mL	>20	40–79 µmol/L
Procainamide	4–10 mcg/mL	>12	17–42 µmol/L
Propranolol	50–100 ng/mL	>150	
Quinidine	2–5 mcg/mL	>8	6–15 µmol/L
Salicylate	15–20 mg/dL	>30	1.1–1.4 mmol/L
Theophylline	10–20 mcg/mL	>20	

Antibiotic Levels (Peak and Trough)

Antibiotic	Peak	Critical	Trough	Critical
Amikacin	C: 20–30 mcg/mL	>30	1–8 mcg/mL	>8
	SI: 34–51 µmol/L	>51	2–14 µmol/L	>14
Gentamicin	C: 6–10 mcg/mL	>12	0.5–1.5 mcg/mL	>2
	SI: 12–21 µmol/L	>25	1–3 µmol/L	>3
Tobramycin	C: 6–10 mcg/mL	>12	0.5–1.5 mcg/mL	>2
	SI: 12–21 µmol/L	>26	1–3 µmol/L	>3
Vancomycin	C: 30–40 mcg/mL	>80	5–10 mcg/mL	>20
	SI: 21–28 µmol/L	>55	3–7 µmol/L	>14

C = conventional; SI = SI units

Urinalysis (UA)

Lab	Conventional
Appearance	Clear
Color	Yellow (straw)
pH	5.0–9.0
Protein	<20 mg/dL
Glucose	Negative
Ketones	Negative
Hemoglobin	Negative
Bilirubin	Negative
Urobilinogen	Up to 1 mg/dL
Nitrite	Negative
Leukocyte esterase	Negative
Specific gravity	1.001–1.029
Osmolality	250–900 mOsm/kg
RBC	<5/hpf
WBC	<5/hpf
Renal cells	None seen
Transitional cells	None seen
Squamous cells	Rare; usually no significance
Casts	Rare hyaline; otherwise, none seen

Blood Gas Analysis

Arterial Blood Gas

Lab	Conventional	SI Units
pH (<7.20; >7.60)	7.35–7.45	7.35–7.45
PO ₂ (<45 mm Hg)	80–95 mm Hg	10.6–12.6 kPa
PCO ₂ (<20; >67 mm Hg)	35–45 mm Hg	4.66–5.98 kPa
HCO ₃ (<10; >40 mmol/L)	18–23 mEq/L	18–23 mmol/L
Base excess	(-2)–(+3) mEq/L	(-2)–(+3) mmol/L
CO ₂	22–29 mEq/L	22–29 mmol/L
O ₂ Saturation	95%–100%	95–100%

Venous Blood Gas

Lab	Conventional	SI Units
pH	7.32–7.43	7.32–7.43
PO ₂	20–49 mm Hg	2.6–6.5 kPa
PCO ₂	41–51 mm Hg	5.4–6.8 kPa
HCO ₃	24–28 mEq/L	24–28 mmol/L
CO ₂	25–30 mEq/L	25–30 mmol/L
O ₂ Saturation	70%–75%	70%–75%

NCLEX Acid–Base Imbalance

Imbalance	pH	PCO ₂	PO ₂	HCO ₃	Compensation
Respiratory Acidosis					Kidneys conserve HCO ₃ ; eliminate H ⁺ to ↑ pH
Uncompensated	↓	↑	Normal	Normal	
Compensated	Normal	↑	↑	↑	
Respiratory Alkalosis					Kidneys eliminate HCO ₃ ; conserve H ⁺ to ↓ pH
Uncompensated	↑	↓	Normal	Normal	
Compensated	Normal	↓	↓	↓	
Metabolic Acidosis					Hyperventilation to blow off excess CO ₂ and conserve HCO ₃
Uncompensated	↓	Normal	↓	↓	
Compensated	Normal	↓	↓	↓	
Metabolic Alkalosis					Hypoventilation to ↑ CO ₂ Kidneys keep H ⁺ and excrete HCO ₃
Uncompensated	↑	Normal	↑	↑	
Compensated	Normal	↑	↑	↑	

NCLEX Common Causes of Acid–Base Imbalance

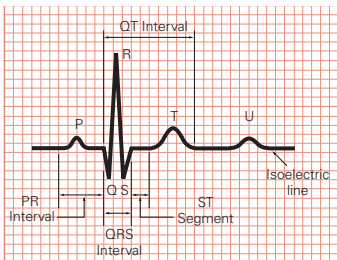
Respiratory acidosis	Asphyxia, respiratory and CNS depression.
	Hyperventilation, anxiety, DKA.
Metabolic acidosis	Diarrhea, renal failure, salicylate (aspirin) OD.
	Hypercalcemia, OD on an alkaline (antacid).

Cerebrospinal Fluid (CSF)

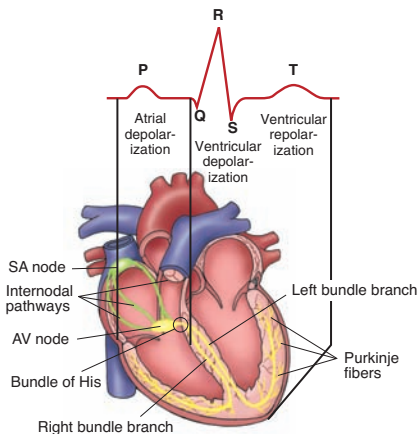
Lab (lumbar puncture)	Conventional	SI Units
Color	Crystal clear	Crystal clear
Protein	15–45 mg/dL	150–450 mg/L
Glucose	40–70 mg/dL	2.2–3.9 mmol/L
Lactic acid	<25.2 mg/dL	<2.8 mmol/L
Myelin basic protein	<4 ng/mL	<4 mcg/L
Oligoclonal bands	Absent	Absent
IgG	<3.4 mg/dL	<34 mg/L
Gram stain	Negative	Negative
India ink	Negative	Negative
Culture	No growth	No growth
RBC count	Zero	Zero
WBC count	0–5/mL	0–5 × 10 ⁶ /L

Basic ECG Interpretation

Electrical Conduction and Cardiac Anatomy



Components of the ECG



Normal ECG Parameters

NSR	60 and 100 bpm
SB	<60 bpm
ST	>100 bpm
SVT	>150 bpm
QRS	0.06–0.10 seconds
PR Interval	0.12–0.20 seconds
Atrial rate, inherent	60–100 bpm
Junctional rate, inherent	40–60 bpm
Ventricular rate, inherent	20–40 bpm

Systematic ECG Assessment

Rate	Is it normal (60–100), fast (>100), or slow (<60)?
Rhythm	Is it regular, irregular?
P waves	Are they present? Are they 1:1 with the QRS?
PRI	Is it normal (0.12–0.2 sec)? Does it remain consistent?
QRS	Is it normal (0.06–0.10 sec) or is it wide (>0.10 sec)?
Extra	Are there any extra or abnormal complexes?

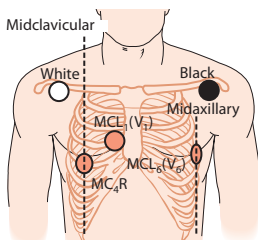
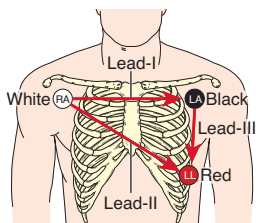
Analyzing the PR Interval

Finding	Conclusion
PRI is consistent, and normal, between 0.12 and 0.20 sec (3–5 small boxes).	Normal PRI.
PRI is <0.12 sec (3 small boxes).	Junctional rhythm.
PRI is longer than 0.20 sec (5 small boxes), it remains consistent in length from PRI to PRI.	1° AV block.
Progressive lengthening of PRI until QRS is dropped.	2° AV block type-I (Mobitz I or Wenckebach).
Consistent PRI, however, there are additional P waves that do not precede a QRS complex.	2° AV block type-II (Mobitz II).
PRI is not consistent, nor is there any correlation between P wave and QRS.	3° AV block (complete heart block).

Analyzing the QRS

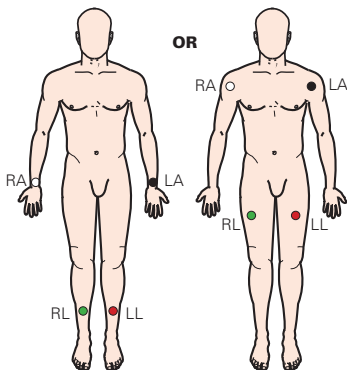
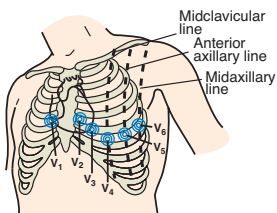
Finding	Conclusion
QRS \leq 0.10 sec	Normal.
QRS >0.10 sec, “wide and bizarre”	Ventricular ectopy.
QRS >0.10 sec (2.5 small boxes), with notched or “rabbit ears” appearance	BBB (see differentiating right and left BBB)
QRS preceded by 1–2 very narrow “spikes”	Pacemaker.

Standard Three- and Five-Wire Lead Placement



12-Lead ECG

12-Lead Placement (Chest and Limb Leads)



Localizing Ischemia on 12-Lead

Assess quality of 12-lead tracing.

- Lead aVR should have a predominantly negative deflection.
- Confirm 1 mV (2 large boxes) of standard calibration.

Look for lead changes suggestive of an MI*

- **LBBB (new):** *Diagnosis of AMI is confounded by LBBB.
 - QRS: >0.10 seconds.
 - V_1, V_2 : predominantly negative (QS in V_1).
- **T-wave inversion (ischemia)** Should appear symmetrical. T-wave inversion in I, V_5, V_6 is suggestive of LBBB.
- **ST elevation (injury)** 1 mm or more of ST elevation in two or more contiguous leads confirms MI. Elevation is usually associated with reciprocal ST depression in other leads.
- **Significant Q waves (infarct)** Suggestive of MI. A large Q wave is normal in aVR (not used in diagnosing AMI). Small Q waves (<0.4 sec.) can be normal in leads I, aVL, V_5, V_6 .
- **ST depression (consistent with NSTEMI)** May be present in V_1-V_4 without reciprocal ST elevation (posterior MI).

Assessment of Acute MI Patterns

ST Elevation Pattern	Area of MI	Related Findings
II, III, and aVF	Inferior	↓BP, use NTG/MS cautiously.
I, aVL, V_5, V_6	Lateral	LV dysfunction, AV blocks.
V_1, V_2	Septal	BBBs common.
V_3, V_4	Anterior	CHF, 3° HB, BBBs common.
V_4R-V_6R	RV	↓BP, A-fib/flutter, PACs, AV blocks.
V_1-V_4 (ST depression)	Posterior	LV dysfunction.

Reciprocal Lead Changes

Leads with ST Elevation	Reciprocal ST Depression
II, III, aVF	I, aVL, V ₃ , V ₄
I, aVL, V ₅ , V ₆	II, III, aVF
V ₃ , V ₄	II, III, aVF
No ST elevation (NSTEMI?)	V1–V ₄ (suspect posterior MI)

Differentiating Wide-Complex Tachycardias

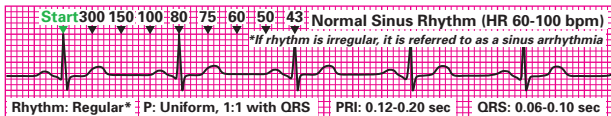
SVT with Aberrancy	Ventricular Tachycardia
<ul style="list-style-type: none"> • I, aVL: Positive • V₁: Triphasic • Associated P waves 	<ul style="list-style-type: none"> • I, aVL: Negative • V₁: Biphasic or positive • aVR: Positive • Concordance in V₁–V₆ (all negative or all positive) • Fusion or capture beats

Differentiating RBBB from LBBB

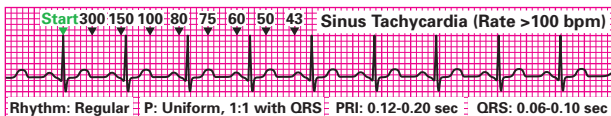
LBBB	RBBB
<ul style="list-style-type: none"> • QRS: >0.10 seconds. • V₁, V₂: predominantly negative (QS in V1). • I, V₅, V₆: blunted, upright QRS with T-wave inversion. 	<ul style="list-style-type: none"> • QRS: >0.10 seconds. • V₁, V₂: Predominantly positive, rSR' or rR' (rabbit ears). • I, V₅, V₆: slurred S wave.

Sample ECG Rhythms

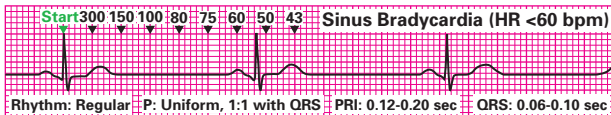
SR



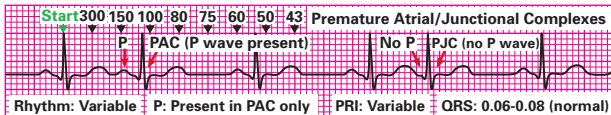
ST



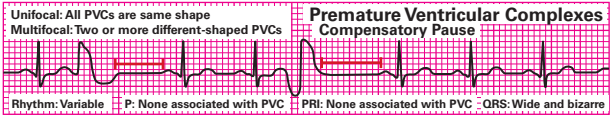
SB



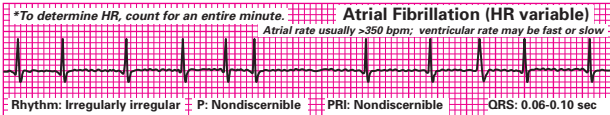
PAC PJC



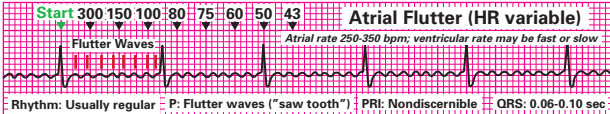
PVC



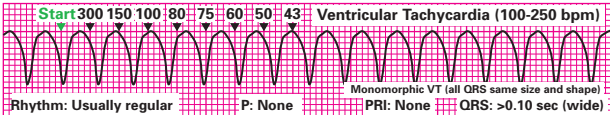
A-Fib



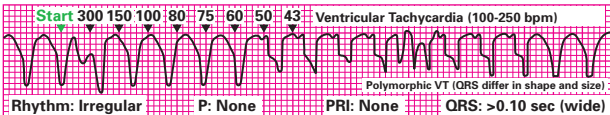
A-Flutter



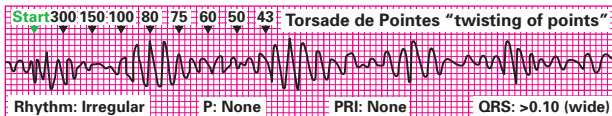
VT: Monomorphic



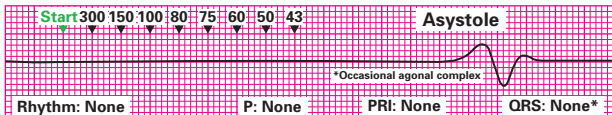
VT: Polymorphic



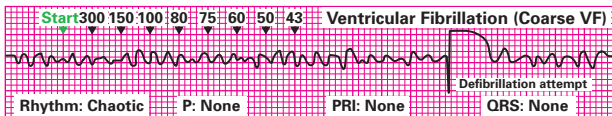
Torsade de Pointes



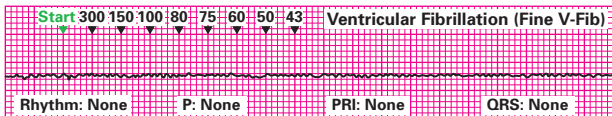
Asystole



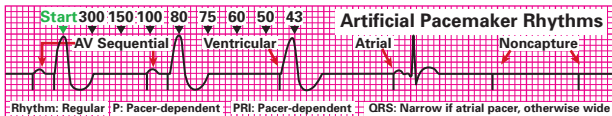
VF: Coarse



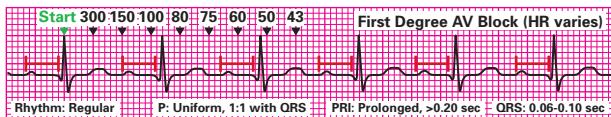
VF: Fine



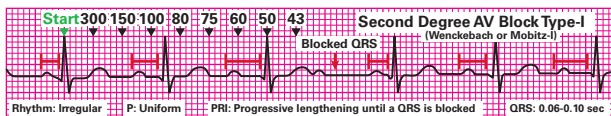
Pacemaker



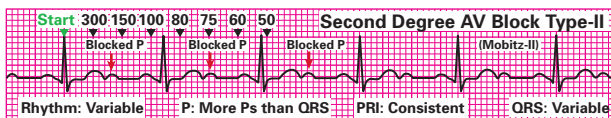
1st Degree



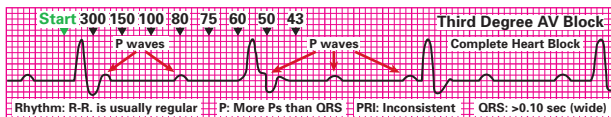
2nd Degree Type-I



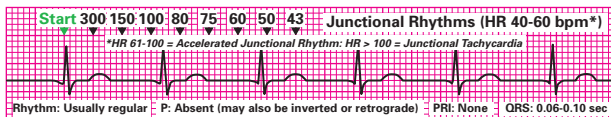
2nd Degree Type-II



3rd Degree



Junctional



Standard-to-Metric Conversions

Weight		Temperature		Height	
lb	kg	°F	°C	in.	cm
325	148	212	100 boil	56	142
300	136	107	42.2	57	145
275	125	106	41.6	58	147
250	114	105	40.6	59	150
225	102	104	40.0	60	152
210	96	103	39.4	61	155
200	91	102	38.9	62	157
190	86	101	38.3	63	160
180	82	100	37.8	64	163
170	77	99	37.2	65	165
160	73	98.6	37.0	66	168
150	68	98	36.7	67	170
140	64	97	36.1	68	173
130	59	96	35.6	69	175
120	55	95	35.0	70	178
110	50	94	34.4	71	180
100	46	93	34.0	72	183
90	41	92	33.3	73	185
80	36	91	32.8	74	188
70	32	90	32.1	75	191
60	27	32	0 freeze	76	193
50	23			77	196
40	18			78	199
30	14				
25	11				
20	9				
15	7				
10	4.5				
5	2.3				

Common Equivalents

Volume	Weight
1 cc 1 mL	1 mg 1000 mcg
1 tsp 5 mL	1 gram 1000 mg
1 tbsp 15 mL	1 kg 1000 gram
1 oz 30 mL	1 grain 60 mg
1 cup 240 mL	1/150 grain 0.4 mg
1 pint 473 mL	1 kg 2.2 lb
1 quart 946 mL	1 liter of fluid 1 kg
1 liter 33.5960 oz	1 oz 28 g

Common Conversion Formulas

	Standard	Metric
Weight	lb = kg \times 2.2	kg = lb \times 0.45 or (lb \div 2) – 10%
Temp	$^{\circ}\text{F} = (^{\circ}\text{C} \times 1.8) + 32$	$^{\circ}\text{C} = (^{\circ}\text{F} \times 32) \times 0.556$
Volume	Oz to mL = oz \times 30	mL to oz = mL \div 30
Length	Inches = cm \times 0.394	cm = inches \times 2.54

Body Surface Area (BSA)

Using cm and kg	Using in. and lb
$\sqrt{\frac{\text{height} \times \text{weight}}{3600}}$	$\sqrt{\frac{\text{height} \times \text{weight}}{3131}}$

Waist-to-Hip Ratio

- Measure circumference of waist at its narrowest point with stomach relaxed.
- Measure circumference of hips at fullest point where buttocks protrude most.
- Divide circumference of waist by circumference of hips.
 - Women should have a waist-to-hip ratio ≤ 0.8 .
 - Men should have a waist-to-hip ratio ≤ 0.95 .

NCLEX Consent

- **Informed:** Pt understands and agrees to treatment.
- **Implied:** Presumption that an unconscious or mentally incapacitated Pt would, under normal circumstances, consent to lifesaving treatment. Note: A competent adult who regains consciousness may refuse treatment.
- **Expressed:** Verbal, nonverbal gesturing, or written consent. Note: The absence of objection (by a competent adult) may be considered a form of expressed consent.
- **Involuntary:** Consent to treat is granted by law enforcement.

Documentation: SOAP Format

Subjective Data

- Chief complaint as described by Pt.
- Family or bystander information.
- SAMPLE History.
- Symptom analysis (see OPQRST).

Objective Data

- Initial impression of Pt.
- Mechanism of injury.
- Vital signs and physical assessment.

Assessment

- Medical: Probable or suspected etiology of medical problem (most often, this is Pt's chief complaint).
- Trauma: Obvious or suspected injury(s).

Plan (including response to treatment)

- Treatment (O₂, c-spine, IV, drugs, splinting, etc.).
- Pt response to treatment.

Cultural Diversity in Health Care

Selected References: Purnell, L, and Paulanka, B: *Guide to Culturally Competent Health Care*. Philadelphia: F.A. Davis, 2005.

American Indian

Communication: Greetings should be formal. Long periods of silence are normal. Talking loud is rude. Physical contact from strangers is unacceptable; however, shaking hands is okay. Personal space is generally greater by Western standards.

Health-care Practices: A lot of questioning during an assessment may foster mistrust. Most individuals are stoic by Western standards, and it is believed that pain should be endured.

Taboos and Disrespect: Direct eye contact and pointing.

Arab Heritage

Communication: Speech may be loud, expressive, and involve gesturing, with an emphasis placed on nonverbal communication; avoid misinterpreting as anger or confrontation. Title is important; ask how Pt or family prefers to be addressed. Shaking hands (right hand only) is okay, but males should not initiate a handshake with a female.

Health-care Practices: Same-gender health-care provider is strongly preferred. Reluctant to share sensitive medical information with strangers. Most individuals are stoic; take cues from family members regarding Pt discomfort.

Taboos and Disrespect: The left hand is used for toileting and is considered dirty. Direct eye contact between members of the opposite sex may be considered disrespectful.

Asian Heritage

C, J, K, and V refer to Chinese, Japanese, Korean, and Vietnamese.

Communication: Greetings should be formal (C, J, K, V). Direct eye contact (C, J, K) or invasion of personal space (C, J) may cause uneasiness. Touch only when necessary (C, J, V). Shaking hands is okay (J, K), but males should not initiate a handshake with females (V).

Health-care Practices: Same-gender health-care provider is strongly preferred by women (C, K, V). May seek traditional, alternative treatment first, before accepting Western medicine (C, J, K, V). May be reluctant to accept pain medication (J, K).

Taboos and Disrespect: Open discussion about serious illness and death (J), addiction (J), mental illness (J), **NCLEX** direct eye contact (C, J, V), pointing (V), **NCLEX** touching the head (V).

Bosnian Heritage

Communication: Older and traditional Pts expect formal greetings. Females maintain eye contact with other women but not with men. Physical contact between genders is not exhibited in public. Shaking hands (right hand only) is okay, but males should not initiate handshake with a female. Asking too many questions may cause apprehension.

Health-care Practices: High value placed on cleanliness. Same-gender health-care provider is strongly preferred. Most individuals are stoic by Western standards; take cues from family regarding Pt discomfort.

Taboos and Disrespect: Left hand is used for toileting and considered dirty.

Cuban Heritage

Communication: Speech tends to be loud and fast by Western standards. Direct eye contact is acceptable during conversation. Greetings should be formal. Shaking hands and casual contact are okay, but physical contact during an assessment may need to be explained.

Health-care Practices: Language is the biggest barrier to health care and many may seek traditional, alternative treatment first; otherwise, Western medicine openly accepted. Pain is expressed openly as verbal complaints, moaning, and crying.

Taboos and Disrespect: None noted.

Filipino Heritage

Communication: Adults should be greeted formally. Prolonged eye contact is avoided with a figure of authority or elders. Meanings are embedded in nonverbal communication. Male health-care workers should avoid prolonged eye contact with younger females. Close, personal space should be respected.

Health-care Practices: High value placed on personal cleanliness. May seek traditional, alternative treatment first. More stoic by Western standards; may refuse pain medication.

Taboos and Disrespect: None noted.

Haitian Heritage

Communication: Greetings should be formal and shaking hands is okay. Haitians are very expressive with their emotions, including loud animated speech. Do not misinterpret loud speech as anger. Eye contact with authority figures is avoided, but otherwise acceptable. Casual touching is a common gesture and is not considered inappropriate.

Health-care Practices: It is common for Haitians to use traditional and Western practitioners simultaneously. Privacy is highly regarded; therefore, family should not be used for interpretation. Pain manifests outwardly with moaning and facial expressions. Many have a very low pain threshold.

Taboos and Disrespect: None noted.



Mexican Heritage

Communication: Emphasis is placed on verbal communication.

Greetings should be formal. Older generations may regard direct eye contact as disrespectful, but many younger generations do not.

Shaking hands is okay, but physical contact during assessment may need to be explained.

Health-care Practices: Assumption of the sick role is highly tolerated by family. May need to explain pain medication.

Taboos and Disrespect: Direct eye contact with elderly.

Puerto Rican Heritage

Communication: Speech is fast by Western standards. Greetings should be formal. Older generations may regard direct eye contact as disrespectful, but many younger generations encourage it. Shaking hands is encouraged. Older women may require a larger personal space when interacting with men.

Health-care Practices: Women may need to consult husband prior to signing consent. May request same-gender health-care provider. Many combine traditional, folk, and Western medicine. Many tend to be loud and outspoken when expressing pain. Pain medication is openly accepted. Older generations may not understand the concept of a pain scale.

Taboos and Disrespect: Addressing Pt or family with terms such as “honey” may be considered disrespectful. Refusing food from family members may be regarded as personal rejection.

Russian Heritage

Communication: Greetings should be formal. Direct eye contact and touching are acceptable, independent of age and gender. Until trust is established, Pts may be standoffish toward health-care workers.

Health-care Practices: Cupping is a form of suction cup–like therapy used to treat a multitude of respiratory illnesses. It produces bruising on the back, which may be misinterpreted as a sign of abuse. More stoic by Western standards and are not likely to ask for or accept pain medication.

Taboos and Disrespect: None noted.

Basic English-to-Spanish Translation

English Phrase • [pro·nun·ci·a·tion] • *Spanish Phrase*

Introductions—Greetings

Hello [oh-lah] Hola

Good morning [bweh-nohs dee-ahs] Buenos días

Good afternoon [bweh-nohs tahr-dehs] Buenos tardes

Good evening [bweh-nahs noh-chehs] Buenas noches

My name is [meh yah-moh] Me llamo

I am a medic [soy lah el meh-di-co] Soy la/el médico

I am a nurse [soy lah oon en-fehr-meh-ra] Soy la enfermera

What is your name? [koh-moh seh yah-mah oo-sted?] ¿Como se llama usted?

How are you? [koh-moh eh-stah oo-stehd?] ¿Como está usted?

Very well [mwee b'yehn] Muy bien

Thank you [grah-s'yahs] Gracias

Yes, No [see, noh] Sí, No

Please [pohr fah-vohr] Por favor

You're welcome [deh nah-dah] De nada

Assessment—Areas of the Body

Head [kah-beh-sah] Cabeza

Eye [oh-hoh] Ojo

Ear [oh-ee-doh] Oído

Nose [nah-reez] Nariz

Throat [gahr-gahn-tah] Garganta
Neck [kweh-yoh] Cuello
Chest, Heart [peh-choh, kah-rah-sohn] Pecho, corazón
Back [eh-spahl-dah] Espalda
Abdomen [ahb-doh-mehn] Abdomen
Stomach [eh-stoh-mah-goh] Estómago
Rectum [rehk-toh] Recto
Penis [peh-neh] Pene
Vagina [vah-hee-nah] Vagina
Arm [brah-soh] Brazo
Hand [mah-noh] Mano
Leg [p'yehr-nah] Pierna
Foot [p'yeh] Pie

Assessment—History

Do you have... [T'yeh-neh oo-stehd...] ¿Tiene usted...

- Difficulty breathing? [di-fi-kul-thad pah-reh-reh-spee-rahr] ¿Dificultad para respirar?
- Chest pain? [doh-lorh hen el peh-chow] ¿Dolor en el pecho?
- Abdominal pain? [doh-lorh ab-do-mee-nahl] ¿Dolor abdominal?
- Diabetes? [dee-ah-beh-tehs] ¿Diabetes?

Are you... [ehs-tah...] ¿Está...

- Dizzy? [eh-mar-eh-a-dho(dha)] ¿Mareado(a)?
- Nauseated? [eh-kohn now-say-as] ¿Con náuseas?
- Pregnant? [ehm-bah-rah-sah-dah?] ¿Embarazada?

Are you allergic to any medications? [ehs ah-lehr-hee-koh ah ahl-goo-nah meh-dee-see-nah?] ¿Es alérgico a alguna medicina?

Assessment—Pain

Do you have pain? [T'yeh-neh oo-stehd doh-lorh?] ¿Tiene usted dolor?
 [(0) cero, (1) uno, (2) dos, (3) tres, (4) cuatro, (5) cinco, (6) seis,
 (7) siete, (8) ocho, (9) nueve, (10) diez]

Where does it hurt? [dohn-deh leh dweh-leh?] ¿Dónde le duele?

Is the pain... [es oon doh-lor...] ¿Es un dolor...

- Dull? [Leh-veh] ¿Leve?
- Aching? [kans-tan-teh] ¿constante?

- Crushing? [ah-plahs-**than**-teh?] ¿Aplastante?
- Sharp? [ah-**goo**-doh?] ¿Agudo?
- Stabbing? [ah-**poo**-neo-lawn-teh] ¿Apuñalante?
- Burning? [Ahr-**d'yen**-teh?] ¿Ardiente?

Does it hurt when I press here? [Leh dweh-**leh** kwahn-doh leh ah-pree-eh-toh ah-kee?] ¿Le duele cuando le aprieto aquí?

Does it hurt to breathe deeply? [S'yen-teh oo-**sted** doh-lor kwahn-doh reh-spee-rah pro-foon-dah-**men**-teh?] ¿Siente usted dolor cuando respira profundamente?

Does it move to another area? [Lh doh-lor zeh moo-eh-veh á **oh**-thra ah-ri-ah] ¿El dolor se mueve a otra area?

Is the pain better now? [**c-n**-teh al-goo-nah me-horr-**ee**-ah] ¿Siente alguna mejoría?

Symbols and Abbreviations

ā before

α alpha

β beta

@ at

pound, quantity

" inch

® right

Ⓐ left

Ⓑ bilateral

↑ increase

↓ decrease

Ψ psychiatric

∅ none, no

Δ change

/ per or divided by

< less than

> greater than

° degrees

Rx treatment, prescription

μ micro

AAA abdominal aortic aneurysm

ABC automated blood count, (airway, breathing, circulation)

ABD abdominal (dressing)

ABG arterial blood gas

AC before meals (a.m.), antecubital

ACE angiotensin-converting enzyme

ACLS advanced cardiac life support

ACS acute coronary syndrome

ACTH adrenocorticotropin hormone

AD right ear, Alzheimer's disease

ADA American Diabetic Association

ADH antidiuretic hormone

ADHD attention deficit-hyperactivity disorder

ADL activities of daily living

ADR adverse drug reaction

AED automated external defibrillator

AHA American Heart Association

AIDS acquired immune deficiency syndrome

AKA above knee amputation

ALOC altered level of consciousness

ALS advanced life support, amyotrophic lateral sclerosis

AMI acute myocardial infarction

AMPLE see SAMPLE

AMS altered mental status, acute mountain sickness

AP anterior to posterior

APAP abbreviation for acetaminophen, Tylenol

APGAR appearance, pulse, grimace, activity, respiration

aPTT activated partial thromboplastin time

AS left ear

ASA abbrev. for aspirin

AU both ears

AV atrioventricular

AVB atrioventricular block

AVM arteriovenous malformation

AVPU alert, verbal, painful, unresponsive

BBB bundle branch block

BCC, BCCa basal cell carcinoma

BE barium enema, base excess

b.i.d. twice a day

BJA below knee amputation

BM bowel movement

BMI body mass index

BP blood pressure

BPH benign prostatic hyperplasia

BPM beats per minute

BS blood sugar, bowel sounds

BSA body or burn surface area

BUN blood urea nitrogen

BVM bag-valve mask

c with

°C degrees Celsius, centigrade

C & S or CS culture and sensitivity

Ca⁺⁺ calcium

CA cancer

CAD coronary artery disease

CBC complete blood count

CBG chemical blood glucose

CDC Centers for Disease Control

CF cystic fibrosis

CHB complete heart block

CHF congestive heart failure

CI cardiac index

Cl⁻ chloride

CNS central nervous system

CO carbon monoxide, cardiac output

CO₂ carbon dioxide

COPD chronic obstructive pulmonary disease

CP chest pain, cerebral palsy

CPAP continuous positive airway pressure

CPR cardiopulmonary resuscitation

CSF cerebrospinal fluid

CSM circulation sensory and motor

CT computed tomography

CV cardiovascular

CVA cerebrovascular accident

CVC central venous catheter

CVP central venous pressure

CX circumflex coronary artery

D5W 5% dextrose in water
DBP diastolic BP
DC discontinue, direct current
DIC disseminated intravascular coagulopathy
DKA diabetic ketoacidosis
dL deciliter
DM diabetes mellitus
DOPE dislodgement, obstruction, pneumothorax, equipment
DT delirium tremors
DTS distance, time, shielding
DVT deep vein thrombosis
DZ, **Dz** disease
ECG or EKG electrocardiogram
ED erectile dysfunction, emergency department (ER)
EFM electronic fetal monitoring
EMS emergency medical services
EPS extrapyramidal symptoms
ESR erythrocyte sedimentation rate
ET endotracheal
ETOH abbrev. for alcohol
ETT endotracheal tube
°F degrees Fahrenheit
Fe iron
FFP fresh frozen plasma
FHR fetal heart rate
Fr, **fr** French
GCS Glasgow coma scale
GI gastrointestinal
gtt drop
GU genitourinary
H & H hemoglobin & hematocrit
h, **hr** hour
H⁺ hydrogen ion
HA headache

HACE high altitude cerebral edema
HAPE high altitude pulmonary edema
HAZMAT hazardous material
HB heart block
HCl hydrogen chloride
HCO₃ carbonic acid
Hct hematocrit
HCTZ hydrochlorothiazide
HELLP hemolysis, elevated liver enzymes, low platelets
Hgb hemoglobin
HHNS hyperglycemic, hyperosmolar, non-ketotic syndrome
HIV human immunodeficiency virus
HOB head of bed
HRT hormone replacement therapy
HS hour of sleep (night time)
HTN hypertension
HVS hyperventilation syndrome
IBC iron binding capacity
IBD irritable bowel disease
IBS irritable bowel syndrome
IBW ideal body weight
IC incident commander
ICP intracranial pressure
ICS intercostal space
ID intradermal
IDDM insulin-dependent diabetes mellitus
IHSS idiopathic hypertrophic subaortic stenosis
IM intramuscular
IN intranasal
INH abbrev. for isoniazid

- INR** international ratio
IO intraosseous
I/O intake & output
IV intravenous
IVC inferior vena cava
IVF IV fluid
IVP IV push
IVPB IV piggyback
J joule
JVD jugular vein distention
K⁺ potassium
KB knife blade (scalpel)
KCl potassium chloride
kg kilogram
LAD left anterior descending
LAT lateral
LBBB left bundle branch block
LLQ left lower quadrant
LMA laryngeal mask airway
LNMP last normal menstrual period
LOC level of consciousness
LPM liters per minute
LR lactated Ringer's
LTC left to count
LUQ left upper quadrant
mA milliampere
MAP mean arterial pressure
MAR medication administration record
MAST military antishock trousers
MCA motorcycle accident
mcg microgram
MCI mass casualty incident
MCL modified chest lead
mEq milli equivalent
mg milligram
Mg⁺⁺ magnesium
MgSO₄ magnesium sulfate
MH malignant hyperthermia
MI myocardial infarction
min minute, minimum
mL milliliter
mm millimeter
mm Hg millimeter of mercury
MOA monoamine oxidase
MRI magnetic resonance imaging
MRSA methicillin-resistant *Staphylococcus aureus*
MS morphine, multiple sclerosis, musculoskeletal
MSO₄ morphine sulfate
MVA motor vehicle accident
Na⁺ sodium
NAD no apparent/acute distress
NaHCO₃ sodium bicarbonate
NG nasogastric
NGT nasogastric tube
NI nasointestinal
NIDDM non-insulin-dependent diabetes mellitus
NPA nasopharyngeal airway
NPO nothing by mouth
NRB nonrebreather
NS normal saline
NSAID nonsteroidal anti-inflammatory drug
NSR normal sinus rhythm
NTG nitroglycerin
NTP nitroglycerin paste
n/v nausea and vomiting
O₂ oxygen
OCD obsessive compulsive disorder

- OD** overdose, right eye
- OLMC** online medical control
- OPA** oropharyngeal airway
- OPP** organophosphate
- OPQRST** onset, provocation, quality, radiation, severity, timing
- OS** left eye
- OT** occupational therapy
- OTC** over the counter
- OU** both eyes
- oz** ounce
- p̄** after
- PAC** premature atrial complex
- PAD** peripheral artery disease
- PaO₂** partial pressure of oxygen in arterial blood
- PAP** pulmonary artery pressure
- PASG** pneumatic anti-shock garment
- PCI** percutaneous intervention
- PCW** pulmonary capillary wedge pressure
- PDA** patent ductus arteriosus
- PE** pulmonary embolism, edema
- PEA** pulseless electrical activity
- PEEP** positive end-expiratory pressure
- PERRL** pupils equal, round, and reactive to light
- PET** positron emission tomography
- PFIB** perfluoroisobutene
- pH** potential of hydrogen
- PICC** peripherally inserted central catheter
- PIH** pregnancy-induced hypertension
- PJC** premature junctional complex
- PMI** point of maximal impulse
- PMS** premenstrual syndrome
- PO** per os (by mouth, orally)
- PPD** purified protein derivative (TB skin test)
- PPE** personal protective equipment
- PPV** positive-pressure ventilation
- PPF** plasma protein fraction
- PQRST** see OPQRST
- PRBC** packed red blood cells
- PRI** PR interval
- prn** as needed
- PSA** prostate-specific antigen
- PSI** pounds per square inch
- PSVT** paroxysmal supraventricular tachycardia
- Pt** patient
- PT** prothrombin time, physical therapy
- PTSD** post-traumatic stress disorder
- PTT** partial thromboplastin time
- PVC** premature ventricular complex
- PVD** peripheral vascular disease
- q, Q** every
- q.i.d.** four times per day
- q.o.d.** every other day
- R** regular (insulin)
- RA** rheumatoid arthritis
- RBBB** right bundle branch block
- RCA** right coronary artery
- RL** Ringer's lactate
- RLQ** right lower quadrant

- ROM** range of motion, rupture of membranes
- RR** respiratory rate
- RSI** rapid sequence intubation
- RSV** respiratory syncytial virus
- RT** respiratory therapy, right
- RTS** revised trauma score
- RUQ** right upper quadrant
- s̄** without
- SAMPLE** s/s, allergies, meds, pertinent history, last oral intake, events leading up
- SaO₂** oxygen saturation
- SBP** systolic BP
- SC or SQ** subcutaneous
- SCC** squamous cell carcinoma
- SI** stroke index
- SLP** speech language pathology
- SLUDGEM** salivate, lacrimate, urinate, defecate, GI distress, emesis, miosis or muscle twitching
- SOB** shortness of breath
- SpO₂** pulse oximeter
- ss, s/s** signs and symptoms
- STD** sexually transmitted disease
- SV** stroke volume
- SVC** superior vena cava
- SVR** systemic venous resistance
- T** temperature
- TB** tuberculosis
- TBSA** total burn surface area
- TCA** tricyclic antidepressant
- TCP** transcutaneous pacing
- TF** tube feeding
- TIA** transient ischemic attack
- t.i.d.** three times per day
- TKO** to keep open
- TPN** total parenteral nutrition
- TPR** temperature, pulse, respirations
- TVP** transvenous pacing
- u** unit
- UA** urinalysis
- UC** ulcerative colitis
- UO** urine output
- URI** upper respiratory infection
- UTI** urinary tract infection
- VAD** vascular access device
- VF** ventricular fibrillation
- VRE** vancomycin-resistant *Enterococcus*
- VRSA** vancomycin-resistant *Staph. aureus*
- VT** ventricular tachycardia
- WBC** white blood count
- WC** wheelchair
- WMD** weapons of mass destruction
- WPW** Wolfe-Parkinson-White

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