

Scrub the Hub!

Which hubs have to be scrubbed? Every port on the system, injection ports into bags or bottles, injection ports on administration sets, needless connectors, and the hub of a catheter itself are potential portal of entry for infection. Closed catheter access systems are preferred as they are associated with fewer central line–associated bloodstream infections (CLABSIs) than open systems. Stopcocks and injection ports should be capped when not being used.

SCRUB THE HUB YOU ARE ACCESSING EVERY TIME YOU ACCESS IT!

If you continue to have a high rate of infections, consider using alcohol-impregnated port protectors, scrubbing devices, and needless neutral displacement connectors in addition to scrubbing the hub.

How do you scrub the hub? Adequately scrubbing the hub depends on the agent you use, appropriate contact and drying time, and—most important—friction.

To Scrub the Hub

1. Perform hand hygiene.
2. Don clean or sterile gloves.
3. Use a scrubbing device with an alcohol product such as chlorhexidine with alcohol or 70% alcohol to disinfect catheter hub and stopcocks. If you are using a pad, make sure you don't contaminate it before use and use only on one hub. Prep pads should NEVER be reused.
4. Rub for 10 to 15 seconds (unless directed otherwise by the manufacturer's instructions), generating friction by scrubbing in a twisting motion as if you were juicing an orange. Make sure you scrub the top of the hub well, not just the sides.
5. Allow the hub to dry. Prevent it from touching anything while drying.
6. Access the stopcock or injection port only with sterile devices.
7. Infuse medication or draw blood.
8. Discard gloves and perform hand hygiene.

Sources:

Ryder M., et al. Differences in bacterial transfer and fluid path colonization through needlefree connector-catheter systems in vitro. Paper presented at Society for Healthcare Epidemiology of America meeting, Dallas, Apr 29, 2011.
 Sweet MA, et al. Impact of alcohol-impregnated port protectors and needless neutral pressure connectors on central line–associated bloodstream infections and contamination of blood cultures in an inpatient oncology unit. *Am J Infect Control*. 2012 Dec;40(10):931–934. doi: 10.1016/j.ajic.2012.01.025. Epub 2012 May 9.

Medication Administration

What is new What is old?

Allergy Identification



Automated Medication Dispensing System



Medication Errors

- ▶ Report all medication errors.
- ▶ Patient safety is top priority when an error occurs.
- ▶ Documentation is required.
- ▶ The nurse is responsible for preparing a written occurrence or incident report: an accurate, factual description of what occurred and what was done.
- ▶ Nurses play an essential role in medication reconciliation.
- ▶ What is Medication reconciliation. It is checking to see what medications the patient has been taking and does that match what is being ordered currently and for discharge.

Critical Thinking and Medication Administration

- ▶ Knowledge
- ▶ Experience
 - ▶ Psychomotor skills (how to)
- ▶ Attitudes
 - ▶ Be disciplined; take your time.
 - ▶ Be responsible and accountable.
- ▶ Standards
 - ▶ Ensure safe nursing practice.

Medication Administration

- ▶ Keys to accuracy
 - ▶ Avoid distractions and follow the same routine.
 - ▶ Administer only medications you prepare, and never leave prepared medications unattended.
 - ▶ Document medications immediately after administration.
 - ▶ Use clinical judgment in determining the best time to administer prn medications.
 - ▶ When preparing medications, check the medication container label against the medication administration record (MAR) three times.

The Six "Rights"

- ▶ The six rights of medication administration contribute to accurate preparation and administration of medication doses:

1. Right medication
2. Right dose
3. Right patient
4. Right route
5. Right time
6. Right documentation

Maintaining Patients' Rights

- ▶ To be informed about a medication
- ▶ To refuse a medication
- ▶ To have a medication history
- ▶ To be properly advised about experimental nature of medication
- ▶ To receive labeled medications safely
- ▶ To receive appropriate supportive therapy
- ▶ To not receive unnecessary medications
- ▶ To be informed if medications are part of a research study

Medication Administration

- ▶ Must use 2 identifiers such as Name and Birth date or Name and last 4 of SSN.
- ▶ Do not use room number.
- ▶ Bar code scanning may be used. Keep medications in packages and vials, take to bedside. Scan patient, have them state their name and birthdate, scan medications. Do Not over ride computer, Investigate!!
- ▶ Oral medications: able to swallow.
- ▶ All medications
 - ▶ Are there parameters you need to check such as Potassium level, Blood pressure, Clotting times or Apical heart rate?

Medication Administration Parenteral

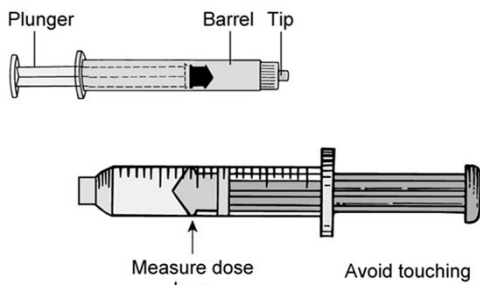
- ▶ Parenteral = Injection into body tissues
- ▶ Invasive procedure that requires aseptic technique
- ▶ Risk of infection
- ▶ Skills needed for each type of injection
- ▶ Effects develop rapidly, depending on the rate of medication absorption.

Medication Administration Parenteral (cont'd)

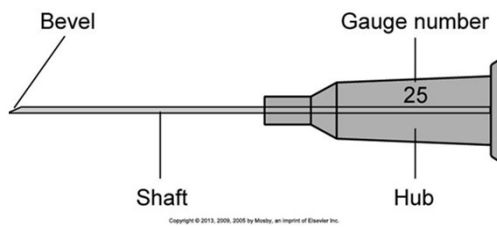
- ▶ Syringes
 - ▶ Luer-Lok
 - ▶ Non-Luer-Lok
 - ▶ Sizes from 0.5 to 60 mL
 - ▶ Larger sizes to administer IV medications and to irrigate wounds or drainage tubes
 - ▶ May be prepackaged with a needle attached, or—
 - ▶ You may need to change a needle



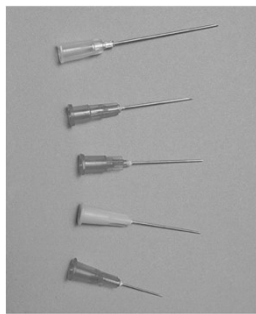
Parts of a Syringe



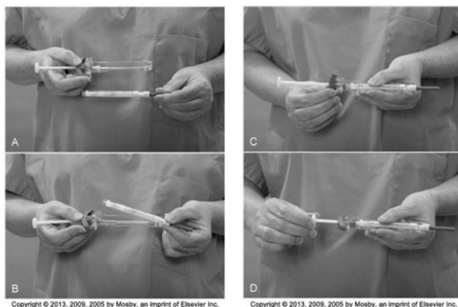
Parts of the Needle



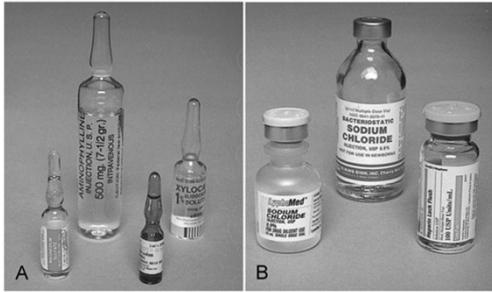
Types of Needles



Disposable Injection Units



Medication Administration Parenteral

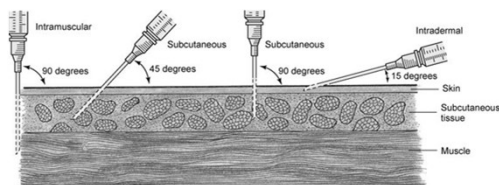


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Administering Injections

- ▶ Each injection route differs based on the types of tissues the medication enters.
- ▶ Before injecting, know:
 - ▶ The volume of medication to administer
 - ▶ The characteristics and viscosity of the medication
 - ▶ The location of anatomical structures underlying the injection site
- ▶ If a nurse does not administer injections correctly, negative patient outcomes may result.

Comparison of Angles of Insertion for Injections



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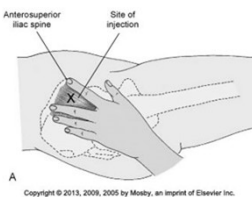
Injections: Intramuscular

- ▶ Faster absorption than subcutaneous route
- ▶ Many risks, so verify the injection is justified
- ▶ Needles
 - ▶ Very obese: 3 inches; use different route
 - ▶ Thin: ½ to 1 inch
- ▶ Amounts:
 - ▶ Adults: 2 to 5 mL can be absorbed
 - ▶ Children, older adults, thin patients: up to 2 mL
 - ▶ Small children and older infants: up to 1 mL
 - ▶ Smaller infants: up to 0.5 mL

Injections: Intramuscular (cont'd)

- ▶ Assess the muscle before giving the injection.
- ▶ Properly identify the site by palpating bony landmarks.
- ▶ Be aware of potential complications with each site.
- ▶ The site needs to be free of tenderness.
- ▶ Minimize discomfort.
- ▶ Insertion angle is 90 degrees.

Landmarks: Ventrogluteal IM

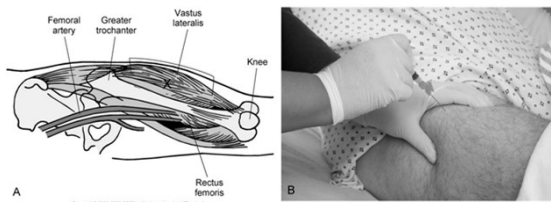


Ventrogluteal IM Injection



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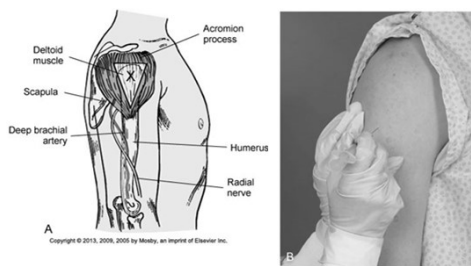
Vastus Lateralis Site for IM Injection



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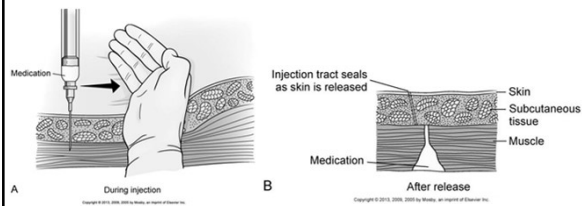
Deltoid Site for IM Injection



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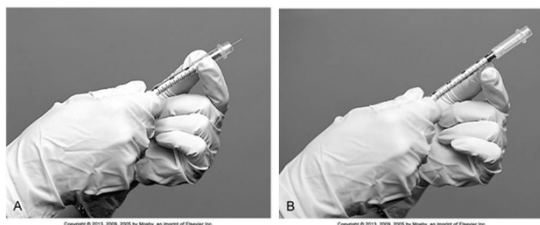
Z-Track Method in IM Injections



Injections: Safety, Needleless Devices

- ▶ 600,000 to 1 million accidental needlesticks and sharps injuries annually in health care
- ▶ Common when workers recap needles, mishandle IV lines and needles, or leave needles at a patient's bedside
- ▶ Exposure to bloodborne pathogens can be deadly.
- ▶ Most needlestick injuries are preventable.
- ▶ Needlestick Safety and Prevention Act

Needle With Plastic Guard



Types of Safety Needles



Sharps Disposal



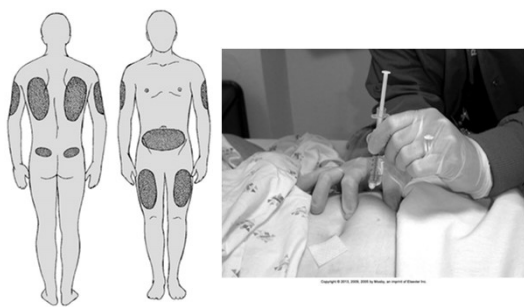
Medication Administration Injections: Subcutaneous

- ▶ Medication is placed in loose connective tissue under the dermis.
- ▶ Absorption is slower than with IM injections.
- ▶ Administering low-molecular-weight heparin requires special considerations.
- ▶ A patient's body weight indicates the depth of the subcutaneous layer.
- ▶ Choose the needle length and angle of insertion based on the patient's weight and estimated amount of subcutaneous tissue.

Insulin Preparation

- ▶ Insulin is the hormone used to treat diabetes.
- ▶ It is administered by injection because the GI tract breaks down and destroys an oral form of insulin.
- ▶ Use the correct syringe:
 - ▶ 100-Unit insulin syringe or an insulin pen to prepare U-100 insulin
- ▶ Insulin is classified by rate of action:
 - ▶ Rapid, short, intermediate, and long-acting
- ▶ Know the onset, peak, and duration for each of your patients' ordered insulin doses.

Subcutaneous Injections



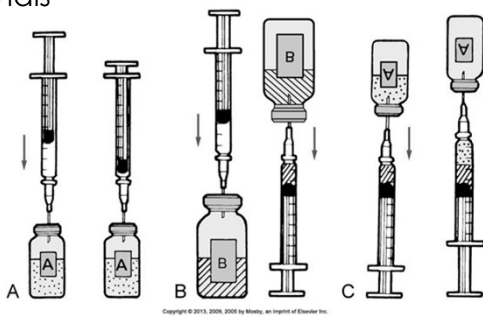
Medication Administration Parenteral (cont'd)

- ▶ If two medications are compatible, they can be mixed in one injection if the total dose is within accepted limits, so the patient receives only one injection at a time.
- ▶ Mixing medications
 - ▶ Mixing medications from a vial and an ampule
 - ▶ Prepare medication from the vial first.
 - ▶ Use the same syringe and filter needle to withdraw medication from the ampule.
 - ▶ Mixing medications from two vials

Mixing Insulins

- ▶ Patients whose blood glucose levels are well controlled on a mixed-insulin dose need to maintain their individual routine when preparing and administering their insulin.
- ▶ Do not mix insulin with any other medications or diluents unless approved by the prescriber.
- ▶ Never mix insulin glargine (Lantus) or insulin detemir (Levemir) with other types of insulin.
- ▶ Inject rapid-acting insulins mixed with NPH insulin within 15 minutes before a meal.
- ▶ Verify insulin doses with another nurse while preparing them if required by agency policy.

Mixing Medications from Two Vials



IV Insertion



Injections: Intravenous

- ▶ Three methods:
 - ▶ As mixtures within **large volumes** of IV fluids
 - ▶ By injection of a **bolus** or small volume of medication through an existing IV infusion line or intermittent venous access (heparin or saline lock)
 - ▶ By "**piggyback**" infusion of a solution containing the prescribed medication and a small volume of IV fluid through an existing IV line
- ▶ Advantages
 - ▶ To administer fast-acting medication
 - ▶ To establish constant therapeutic blood levels
 - ▶ Less irritating method for highly alkaline medications

Large-Volume Infusions

- ▶ Safest and easiest method of IV administration
- ▶ Large volumes (500 or 1000 mL) are used.
- ▶ If infused too rapidly, patient is at risk for overdose and fluid overload.
- ▶ Best practices:
 - ▶ Standardized concentrations and dosages
 - ▶ Standardized procedures for ordering, preparing, and administering IV medications
 - ▶ Ready-to-administer doses when possible

Intravenous Bolus or "Push"

- ▶ Introduces a concentrated dose of medication directly into the systemic circulation
- ▶ Advantageous when the amount of fluid that a patient can take is restricted
- ▶ The most dangerous method for medication administration because there is no time to correct errors
- ▶ Confirm placement of the IV line in a healthy site.
- ▶ Determine the rate of administration by the amount of medication that can be given each minute.


Volume-Controlled Infusions

- ▶ Uses small amounts (50 to 100 mL) of compatible fluids.
- ▶ Three types of containers: volume-control administration sets, piggyback sets, and mini-infusers
- ▶ Advantages of volume-controlled infusion:
 - ▶ Reduces the risk of rapid-dose infusion by IV push
 - ▶ Allows for administration of medications that are stable for a limited time
 - ▶ Allows control of IV fluid intake

Piggyback Setup



IV Piggyback Medication Label

John Jones ¹	Room 2647 ²
MR# 123456 ³	
Hydrocortisone ⁴	100 mg ⁶
(SOLU-CORTEF) ⁵	
In D5W ⁷	IVPB ⁸
Total Volume 50 mL ⁹	
	
Exp: 12/31/2013 ¹²	RPh Initials: AMH ¹¹
Deaconess Hospital Pharmacy ¹⁴	
Infuse medication over 20-30 minutes ¹⁵	

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Injections

- ▶ Intermittent venous access (saline lock)
 - ▶ Advantages:
 - ▶ Cost savings resulting from the omission of continuous IV therapy
 - ▶ Effectiveness of nurse's time enhanced by eliminating constant monitoring of flow rates
 - ▶ Increased mobility, safety, and comfort for the patient
 - ▶ Before administration:
 - ▶ Assess the patency and placement of the IV site.
 - ▶ Check institution policy about the use of heparin.

Administering via Inhalation

- ▶ Aerosol spray, mist, or powder via handheld inhalers; used for respiratory "rescue" and "maintenance"
 - ▶ Pressurized metered-dose inhalers (pMDIs)
 - ▶ Need sufficient hand strength for use
 - ▶ Breath-actuated metered-dose inhalers (BAIs)
 - ▶ Release depends on strength of patient's breath.
 - ▶ Dry powder inhalers (DPIs)
 - ▶ Activated by patient's breath
- ▶ Produce local effects such as bronchodilation
- ▶ Some medications create serious systemic side effects.

Insertion of Urinary Catheter



Neuro Check





Adult Supplementary Insulin Correction Protocol

Correction Insulin should be administered in addition to scheduled Insulin.
Correction Insulin should not be given to patients who are on Insulin Infusions.

Insulin Mealtime or Continuous Nutrition Correction Dose

Insulin injection Subcutaneous

CBG (mg/dL)	Mild Scale	Moderate Scale	Aggressive Scale
<70	Follow Hypoglycemia Protocol		
70-140	No Correction		
141-200	1 unit	2 units	4 units
201-250	2 units	4 units	6 units
251-300	3 units	6 units	10 units
301-350	4 units	8 units	12 units
351-400	5 units	10 units	16 units
>400	Notify MD		

Insulin Bedtime Correction Dose (Patient Who is Eating)

Insulin injection Subcutaneous

CBG (mg/dL)	Mild Scale	Moderate Scale	Aggressive Scale
< 141	No Correction		
141-200	No correction	1 unit	2 units
201-250	1 unit	2 units	3 units
251-300	2 units	3 units	5 units
301-350	2 units	4 units	7 units
351-400	3 units	5 units	12 units
>400	Notify MD		

Insulin for NPO

Insulin injection Subcutaneous

CBG (mg/dL)	Mild Scale	Moderate Scale	Aggressive Scale
< 141	No Correction		
141-200	1 unit	1 unit	4 units
201-250	2 units	3 units	5 units
251-300	2 units	4 units	6 units
301-350	3 units	5 units	8 units
351-400	4 units	6 units	10 units
>400	Notify MD		

ESSENTIAL HEAD TO TOE ASSESSMENT SKILLS

Body System	Assessment Skills
Neurological	<ul style="list-style-type: none"> Assess mental status, level of consciousness, orientation (person-place-time-situation) Evaluate speech Assess if pupils equal/round/ reactive/ accommodate
Head	<ul style="list-style-type: none"> Inspect lips/oral cavity Inspect fontanel (pediatrics) Assess swallowing, presence of gag reflex if appropriate Assess hearing based on conversation Inspect external eyes/color of sclera Assess extraocular movement (EOM) Assess visual acuity (if relevant)
Respiratory	<ul style="list-style-type: none"> Inspect chest shape Assess breathing effort Assess for retractions if labored Auscultate breath sounds bilaterally
Cardiovascular	<ul style="list-style-type: none"> Assess capillary refill Palpate distal pulses Inspect/palpate edema Palpate extremities temperature Inspect extremities for color and hair growth Auscultate heart sounds using A-P-T-M acronym (All Patients Take Meds) <ul style="list-style-type: none"> » Aortic » Pulmonic » Tricuspid » Mitral
GI	<ul style="list-style-type: none"> Inspect abdomen Auscultate bowel sounds Palpate for tenderness/distention Assess stool if present (color/ consistency/odor) Determine last bowel movement

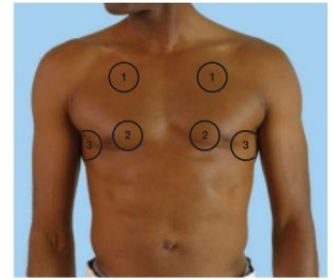
Body System	Assessment Skills
Urinary Reproductive	<ul style="list-style-type: none"> Record urine output amount/24 hour I/O Continually assess I/O throughout shift Record daily weight Assess color/clarity of urine (influenced by amount of intake) Check urinary catheter securement Assess any urethral drainage Record last menstrual period for women of childbearing age (normal 21-35 days apart)
Skin	<ul style="list-style-type: none"> Inspect skin color based on the pigmentation of patient Assess skin temperature Assess skin turgor (speed that skin returns into place once pinched) Assess for diaphoresis Inspect for wounds or surgical incision Assess for redness over pressure points
Musculoskeletal	<ul style="list-style-type: none"> Palpate extremities/joints/ calves for tenderness Observe range of motion Assess muscle strength/tone
Holistic Psychosocial	Determine: <ul style="list-style-type: none"> Cultural considerations Need for emotional support Need for spiritual support Educational priorities Patient goal

THORAX AND LUNGS

****Inspect, then palpate, percuss and auscultate****

PALPATE

- Areas of tenderness
- Test chest expansion
 - Watch distance between thumbs as they move apart during inspiration and feel for symmetry.
- Tactile fremitus: palpate vibrations through bronchopulmonary tree ("99", "one-one-one")
 - Use bony part of palms or ulnar surface of hands
 - Tactile fremitus is normal
 - Decreased in: Pneumothorax, COPD, Asthma



PERCUSSION

- Determines whether air filled, fluid filled or consolidated
- Penetrate 5-7cm below surface
- Middle finger to middle finger***
 - Middle finger of left hand (pleximeter finger), press distal interphalangeal joint and strike with right middle finger (plexor finger)
 - Strike with tip of finger, not pad
 - Thumb, second, fourth and fifth finger are not touching chest.
 - More pressure = louder note
 - Healthy lungs = resonant
- Sounds of Percussion
 - Dullness – fluid or solid tissue [pneumonia, atelectasis, pleural Effusion]
 - Hyperresonance – hyper inflated lung [pneumothorax, COPD, Asthma]
 - Flat – ex: thigh
 - Tympanic – air bubble
- Percuss one side of chest then other side at each level – "Ladder Pattern"
- Extent of Diaphragmatic excursion – distance between the level of dullness of full expiration and the level of dullness on full inspiration (Normal 3-5.5cm)
- Percuss for liver dullness and gastric tympany – move from resonant normal lung tissue



AUSCULTATION

- Before starting, ask patient to cough
- Listen with diaphragm of stethoscope DIRECTLY on skin. Have patient breathe with mouth OPEN
- Use "ladder pattern" when listening to compare sides. → image
- Listen to one full breathe sound in each spot
- Listen for pitch, intensity, duration of inspiratory/expiratory sounds
- Breath Sounds
 - Vesicular – soft & low pitched.
 - Bronchovesicular – inspiratory & expiratory are equal in sound
 - Bronchial – louder, harsher and higher in pitch with short silence between inspiratory and expiratory sounds
 - Expiratory sounds last longer than inspiratory
 - Tracheal – louder harsh sounds over trachea



THORAX AND LUNGS

- **Adventitious Breath Sounds**
 - **Crackles/Rales**: Discontinuous/intermittent
 - Fine: soft high pitch – persistent suggest abnormal lung tissue
 - Course: louder, lower in pitch
 - **Wheezes and Rhonchi**: Continuous
 - Wheeze: high pitch with hissing – narrow airways (asthma, COPD, bronchitis)
 - Rhonchi: low pitch with snoring – secretions in airway
 - **Beware of silent chest with asthma due to minimal air flow/movement
 - **Pleural rubs** – course, biphasic sounds during expiration – pleurisy, pneumonia, pulmonary embolism
- **Transmitted Voice Sounds**
 - *If you hear abnormal bronchovesicular or bronchial breathe sounds assess using:
 - **Use diaphragm of stethoscope
 - **Egophony**: pt say “ee”
 - Normal = muffled long E
 - If E sounds like “A” or “AY” = egophony is present
 - **Bronchophony**: Pt say “99”
 - Normal = muffled and indistinct
 - Louder sounds = bronchophony
 - **Whispered pectoriloquy**: Pt whisper “99” or “1,2,3”
 - Normal = voice is heard faintly and indistinctly
 - Louder, clearer whispered sounds = whispered pectoriloquy

Special Techniques

- **Forced Expiratory Time**: Assess the expiratory phase of breathing
 - Slowed in obstructive pulmonary disease
 - Have pt take a deep breathe in and breathe out as quickly and completely as possible with mouth open
 - Listen over trachea with diaphragm of stethoscope and time the audible expiration
- **ID Fractured Rib**: AP compression can distinguish between fracture and soft tissue injury.
 - One hand on sternum and one hand on thoracic spine; squeeze the chest. Is it painful? Where?

Respiratory Distress

- Tachypnea – RR 25+
- Cyanosis or pallor
- Assess for contraction of accessory muscles
- Observe overall shape of chest
 - Normal AP diameter – 0.7 – 0.75 up to 0.9 and increasing with age



OUTLINE

- I. Introduction
- II. Stethoscope
- III. Auscultation
- IV. Heart Sounds
- V. Murmur

I. INTRODUCTION

Does Cardiac Auscultation Still Have a Role Practice?

- Ascendancy of advanced technology
- Imbalance between cost effective clinical skills and high cost technology
- Neglect and apathy regarding teaching and application of clinical skills because of lack of emphasis on cardiac auscultation resulting in low percentage of students in demonstrating proficiency in these skills
- Detrimental to practitioners as well as patients especially in areas where advanced diagnostic facilities are lacking or unavailable

The Imperative

- Fascination with technology and the wide availability of sophisticated equipment have contributed to the devaluation of the hands on approach to medicine, thus eroding the doctor-patient relationship.
- The need for cost containment predicates and impels the teaching and implementation of clinical skills, not only for the sake of controlling costs but also evaluate treatment decisions and justify expensive testings.
- Good health care professionals must balance health costs, time liability, outcomes and risks with clinical skills in decision making, diagnosis and treatment.

Traditional Methods in Cardiac Auscultation

- Identification of heart sounds relying on audiovisual aids like CD ROMs, tape recorded or videotaped sounds
 - Verbal description of sounds and murmurs like rough, smooth, blowing, musical, train wheel, and sea gull have been used
- Drawbacks include:
 - Different subjects may have different notions of these descriptions
 - They are descriptions and not transliterations
 - Verbal descriptions may be lengthy and rely on rote memory and recall of specific sound is difficult

II. STETHOSCOPE

- Parts of a stethoscope
 - Earpiece
 - Binaurals
 - Tubing
 - Chestpiece
- Bell – more sensitive to **low-pitched** (low velocity) sounds of S3 and the murmur of mitral stenosis
- Diaphragm – better for picking up the relatively **high pitched** (high velocity) sounds of S1 and S2, the murmurs of aortic and mitral regurgitation and pericardial friction rub.
- *Heart sounds in auscultatory areas follow the direction of blood flow.*
 - *Aortic sounds can be heard from apex to aorta, pulmonic from RV to PA, etc.*

III. AUSCULTATION

- The most widely used method of screening for valvular heart disease.

- Listening to the heart has come to epitomize the art of bedside diagnosis.
- Auscultation of heart sounds and murmurs is an important skill in the physical examination that leads directly to important clinical diagnoses.
- Heart sounds and murmurs that originate in the four valves **radiate widely**.
- Use **anatomical location** rather than valve area to describe where murmurs and sounds are best heard
 - Example: **NOT** “at the mitral valve area” **BUT** “at the 4th intercostal, left mid-clavicular line”

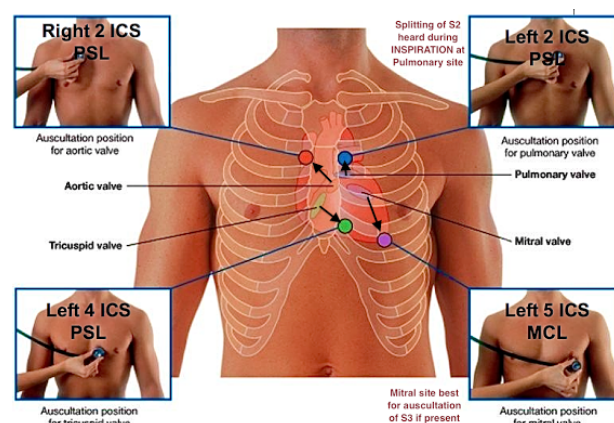


Figure 1. Auscultation Points

Table 1. Auscultatory Points and their Corresponding Locations

AREA	LOCATION
Aortic	2 nd ICS Right Parasternal Border
Pulmonic	2 nd ICS Left Parasternal Border
Tricuspid	4 th ICS Left Parasternal Border
Mitral	5 th ICS Left Midclavicular Line

*ICS- intercostal space

IV. HEART SOUNDS

Rate

- Bradycardic: HR <60 bpm
- Normal rate: HR 60-100 bpm
- Tachycardic: HR > 100 bpm

Regularity

- Regular
- Irregular
 - Regularly Irregular
 - Irregularly Irregular

Identifying S1 and S2

- Keep your left index and middle fingers on the right carotid artery in the lower third of the neck to facilitate **correct identification of S1 and S2**
 - **S1** – just before the carotid upstroke
 - **S2** – follows the carotid upstroke
- The distance between S1 and S2 is **systole** (shorter interval)
- The distance between S2 and the next S1 is **diastole** (longer interval)
 - S1 and S2 are heard in ALL auscultatory areas.

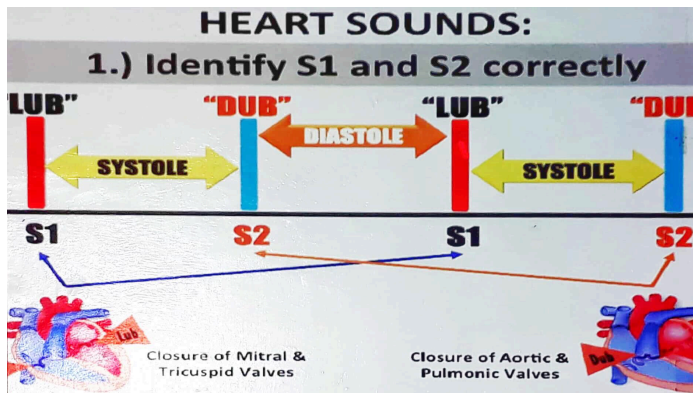


Figure 2. S1 and S2 sounds. If shorter interval is preceded by a sound, that sound must be S1. If longer interval is preceded by a sound, that sound must be S2.

- Be sure to **compare the intensities of S1 and S2** as you move your stethoscope from base to apex or apex to base
 - This is the **inching method** – check APTM or MTPA.

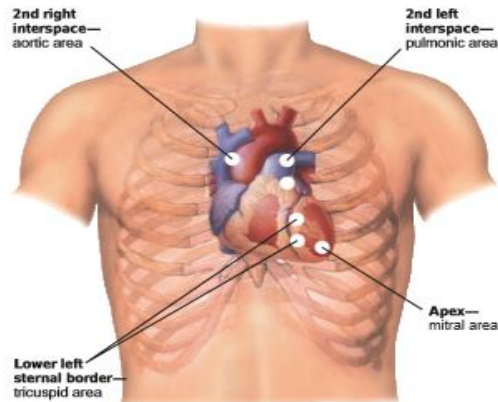


Figure 3. "Inching" from base to apex, or apex to base

- At the base:
 - S2 is louder than S1
 - S2 may be split with respiration
 - Increased flow to the right side increases the flow to the pulmonic valve. Hence, the pulmonic valve is thus open wider so it takes a longer time to close.
- At the apex:
 - S1 is louder than S2
 - S1 may be split with respiration
 - Increased flow to the right side increases the flow to the tricuspid valve. Hence, the tricuspid valve is thus open wider so it takes a longer time to close.
- Also employed is **fine tuning** – focus on one sound first, ability to shut out extraneous sound and concentrate on what you're listening to. Focus on the events of the cardiac cycle.

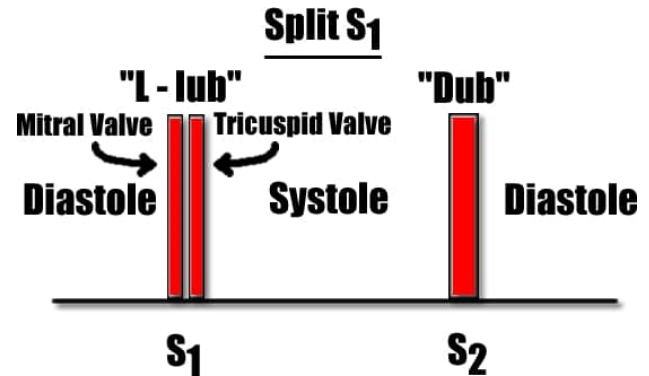
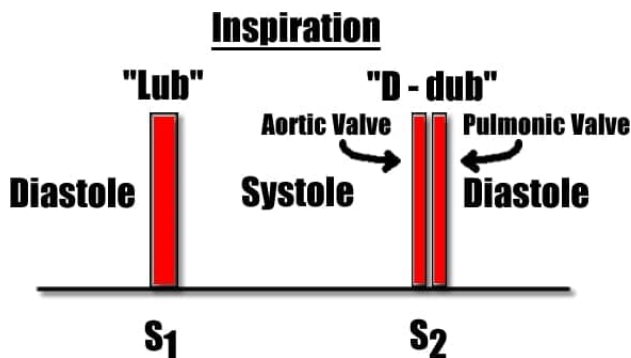


Figure 4. Physiologic S1 and S2 splitting.

Nice to Know:

Abnormal splitting of S2 may come as a result of ASD, Aortic Stenosis and Pulmonic Stenosis.

Sounds and Associated Heart Conditions

Table 1. Associated Cardiophenotics with Heart Conditions

SOUND DESCRIPTION	CONDITIONS
Blowing	Regurgitation
Buzzing, twanging, groaning	Still's murmur
Click	Mitral valve prolapse
Cooing, diastolic murmur	Retroverted aortic cusp
Crepitus	pneumomediastinum
Crunch	Pneumomediastinum
Gallop	Triple rhythm
Honk / Whoop	No-ejection click
Kentucky	S3 gallop
Leathery Sound	Rub
Mill Wheel	Air embolism
Pericardial Knock	Constrictive pericarditis
Plop	Myxoma
Rough Sound	Stenotic murmur
Sail sound	Ebstein's anomaly
Sea gull	Mitral or aortic valve disease
Sigh	Aortic regurgitation
Tambour	Loud A2 in aneurysm
Tennessee	S4 gallop
Train Wheel	Quadruple rhythm
Water Wheel Machinery	Patent Ductus Arteriosus

V. MURMUR

The ff have been lifted from 2021's trans and were not discussed in class.

- Scratching heart sounds because of turbulence
- In turbulence, instead of blood flowing in a laminar fashion in one direction, some blood "counter-flows".
- Murmurs are heard loudest in the area of the lesion
- Correlate the murmur with the pulse, which is systolic.
- Stenosis vs. regurgitation
 - Stenosis – open valve has pathologically narrowed/blocked opening
 - Low pitch since you're forcing the blood into a small opening; you can hear the blood against the hardened valve, more disturbance in stenosis
 - Regurgitation – closed valve is "leaky" and allows backflow of blood (pathologic)
 - High pitch from turbulence
 - Systolic murmurs: aortic/pulmonary stenosis or mitral/tricuspid regurgitation

Timing

- Decide if you are hearing a systolic or a diastolic murmur
 - Systolic murmur: falls between S1 and S2
 - Diastolic murmur: falls between S2 and S1
 - Palpating the carotid pulse as you listen can help you with timing
 - Murmurs coinciding with carotid upstroke are systolic
- Decide if early, middle, or late

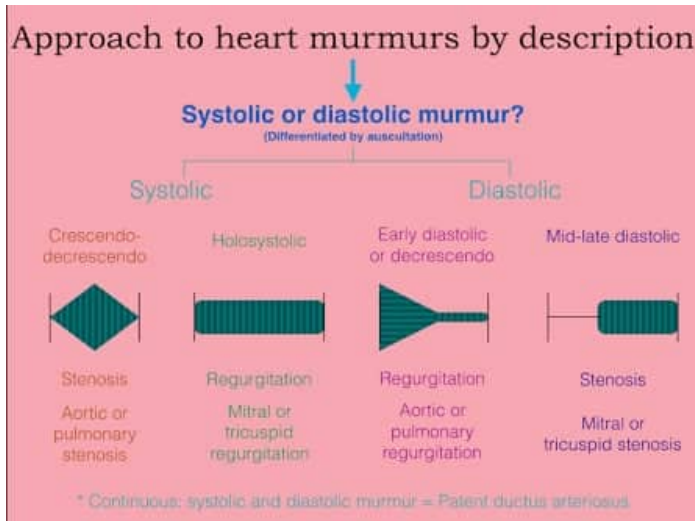


Figure 5. Timing of Murmurs

Shape

- The shape or configuration of a murmur is determined by its intensity over time.

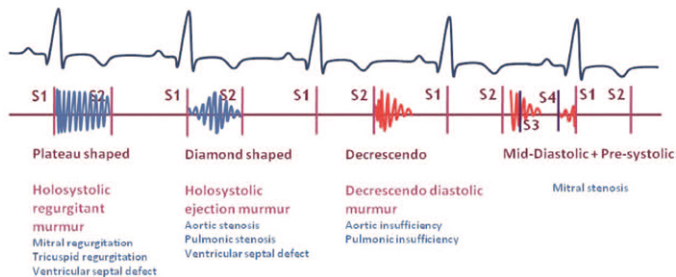


Figure 6. Shapes of murmurs

Radiation from the Point of Maximal Intensity

- Explore the area around a murmur and determine where else you can hear it
- Follow the path of the blood flow!

Pitch and Quality

- Pitch
 - High
 - Medium
 - Low
- Quality
 - Blowing
 - Harsh
 - Rumbling
 - Musical

Intensity

Table 3. Gradation of Murmurs

GRADE	DESCRIPTION
1	Very faint, heard only after listener has "tuned in"; may not be heard in all positions
2	Quiet, but heard immediately after placing the stethoscope on the chest
3	Moderately loud
4	Loud, with palpable thrill
5	Very loud, with thrill . May be heard when the stethoscope is partly off the chest
6	Very loud, with thrill . May be heard with stethoscope entirely off the chest

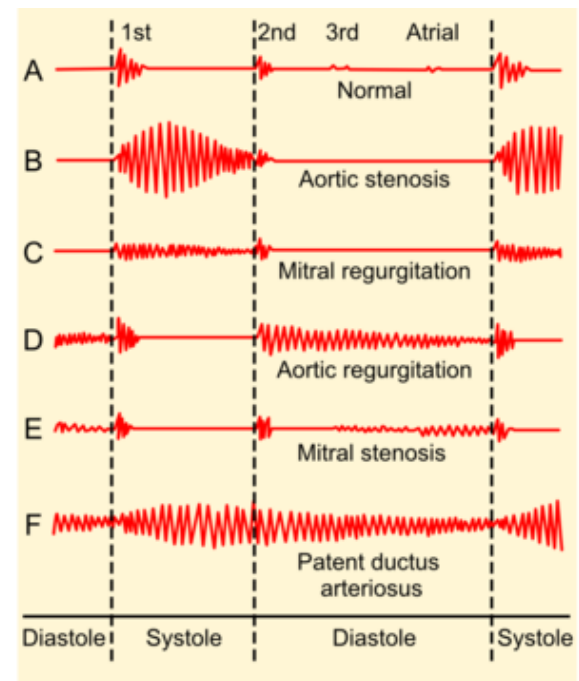


Figure 7. Phonocardiograms from normal and abnormal heart sounds

- Click vs murmur
 - Click - is a "tick," it could be S3 or S4 if relatively close to S2.
 - Murmur - is more prominent, more of a "boogsh/fwooo" than a "tick".
- It is more important to identify the S1 and S2. When they are accurately identified, the intensity is not a necessary criterion (like S1 is louder than the S2 at this area).
- Blowing diastolic murmur means regurgitation.
- Angry purring (cat-like) murmur means mitral stenosis.
- Continuous factory-like murmur means PDA.

REFERENCE

- 2021 Trans

END OF TRANS

Knowing what to look for is enough. Looking for it because you know that it's there. ;)

From 2021: tinyurl.com/heartsoundsbonanza

APPENDIX

From 2021 trans

Table 4: Maneuvers to Identify Systolic Murmurs

MANEUVER	CARDIOVASCULAR EFFECT	EFFECT ON SYSTOLIC SOUNDS AND MURMURS		
		<i>Mitral Valve Prolapse</i>	<i>Hypertrophic Cardiomyopathy</i>	<i>Aortic Stenosis</i>
A. Squatting; Valsalva: Release Phase	Increased left ventricular volume from ↑ venous return to heart	↓ prolapse of mitral valve	↓ outflow obstruction	↑ blood volume ejection into aorta
	Increased vascular tone: ↑ arterial blood pressure, ↑ peripheral vascular resistance	Delay of click and shortening of murmur	↓ intensity of murmur	↑ intensity of murmur
B. Standing; Valsalva: Strain Phase	Decreased vascular tone: ↓ arterial blood pressure	Click moves earlier in systole and murmur lengthens	↑ intensity of murmur	↓ intensity of murmur
A and B	Decreased left ventricular volume from ↓ venous return to heart	↑ prolapse of mitral valve	↑ outflow obstruction	↓ blood volume ejected into aorta

Table 5. Crude compilation of demonstrated heart sounds

HEART CONDITION	'BEATBOX'	TIMING	QUALITY/PITCH	SHAPE
Mitral/Tricuspid Regurgitation	WoooshDUB	Holosystolic (chronic)/ Early systolic (acute)	High pitch	Holosystolic
Aortic/Pulmonic Stenosis	Lub-WOOSHhh DUB	Mid-systolic	Low pitch	Crescendo
Mitral/Tricuspid Stenosis	LUB-Durruuhh	Mid-Diastolic	Coarse rumbling	Holodiastolic with a gap (meaning no entry of blood)
Aortic/Pulmonic Regurgitation	LUB-fwoooohh	Early Diastolic	Blowing, high pitch	Decrescendo
Patent Ductus Arteriosus	SHOOSHwoosh	Continuous	Machine-like	

Disclaimer: minor variations with regards to timing between mitral and tricuspid, and aortic and pulmonic; vary on area on auscultation

JCAHO "Do Not Use" List: Abbreviations, Acronyms and Symbols

Medical errors have been identified as the fourth most common cause of patient deaths in the United States. To help reduce the numbers of errors related to incorrect use of terminology, the Joint Commission on Accreditation of Healthcare Organizations recently issued a list of abbreviations, acronyms and symbols that should no longer be used. The action supports one of JCAHO's national patient safety goals: to improve the effectiveness of communications among caregivers.

Between 44,000 and 96,000 deaths each year may be attributed to medical errors, spawning efforts throughout the healthcare system to systematically address the issues and better protect patient safety. JCAHO's national patient safety goals are one example. This communication shares the information with you as dietetics professionals to take action to help reduce medical errors.

National Patient Safety Goals

JCAHO's effort to further protect patient safety and address this health care issue is embodied in the approval and implementation of seven National Patient Safety Goals (NPSGs). These goals are not accreditation standards -- they are prescriptive accreditation requirements. In summary, they are:

1. Improve the accuracy of patient identification.
2. Improve the effectiveness of communication among caregivers.
3. Improve the safety of using high-alert medications.
4. Eliminate wrong-site, wrong-patient and wrong-procedure surgery.
5. Improve the safety of using infusion pumps.
6. Improve the effectiveness of clinical alarm systems.
7. Reduce the risk of health care-acquired infections.

The National Patient Safety Goals along with their recommendations are published on the JCAHO Web site to maintain the highest level of accessibility to health care organizations, ensuring compliance and overall patient safety. The complete recommendations also can be found on the JCAHO Web site at www.jcaho.org/accredited%2Borganizations/patient%2Bsafety/04%2Bnpsg/04_npsg.htm.

Responsibility of Dietetics Professionals

All dietetics professionals, especially working in areas of clinical practice or providing patient food service, need to be aware of this JCAHO initiative. As leaders in health care, I encourage you to be proactive: Contact your risk managers, patient safety officer and information management and quality departments to review the information that is depicted in the tables below, and identify how you can help reduce medical errors.

These goals are not accreditation standards, they are prescriptive accreditation requirements.

For dietetics professionals working in JCAHO-accredited systems, meeting the national patient safety goal will be required. But even if you do not work in a JCAHO accredited facility, you have a role to play in avoiding terms and abbreviations that could compromise patient safety. For example, if you develop materials for dietetics professionals and students, you can do your part by proactively eliminating these abbreviations in materials you produce.

Medication orders are subject to the initiative, but so is all clinical documentation, including orders, progress notes, consultation reports and operative reports, as well as, educational materials and protocols/pathways.

In January 2004, as JCAHO conducts its facility surveys, it will check to see that any terms on the "list of dangerous abbreviations are not found in handwritten clinical documentation." Organizations found not to be in compliance will be required to submit a plan for continued improvement.

By April 1, 2004, additional terms will be identified and eliminated from use. By the end of 2004, JCAHO

expects full compliance in all handwritten, print and electronic media documents related to these dangerous abbreviations.

A "minimum list" of dangerous abbreviations, acronyms and symbols

Beginning January 1, 2004, the following items must be included on each accredited organization's "Do not use" list:

Set	Item	Abbreviation	Potential Problem	Preferred Term
1.	1.	U (for unit)	Mistaken as zero, four or cc.	Write "unit"
2.	2.	IU (for international unit)	Mistaken as IV (intravenous) or 10 (ten)	Write "international unit"
3.	3. 4.	Q.D., Q.O.D. (Latin abbreviation for once daily and every other day)	Mistaken for each other. The period after the Q can be mistaken for an "I" and the "O" can be mistaken for "I"	Write "daily" and "every other day"
4.	5. 6.	Trailing zero (X.0 mg), Lack of leading zero (.X mg)	Decimal point is missed	Never write a zero by itself after a decimal point (X mg), and always use a zero before a decimal point (0.X mg)
5.	7. 8. 9.	MS MSO ₄ MgSO ₄	Confused for one another Can mean morphine sulfate or magnesium sulfate	Write "morphine sulfate" or "magnesium sulfate"

In addition to the "minimum required list"

The following items should also be considered when expanding the "Do not use" list to include the additional three or more items referenced in the [JCAHOFAQ@jcaho.org](mailto:jcahoFAQ@jcaho.org)

Abbreviation	Potential Problem	Preferred Term
µg (for microgram)	Mistaken for mg (milligrams) resulting in one thousand-fold dosing overdose	Write "mcg"
H.S. (for half-strength or Latin abbreviation for bedtime)	Mistaken for either half-strength or hour of sleep (at bedtime) q.H.S. mistaken for every hour. All can result in a dosing error.	Write out "half-strength" or "at bedtime"
T.I.W. (for three times a week)	Mistaken for three times a day or twice weekly resulting in an overdose	Write "3 times weekly" or "three times weekly"
S.C. or S.Q. (for subcutaneous)	Mistaken as SL for sublingual, or "5 every"	Write "Sub-Q", "subQ", or "subcutaneously"

D/C (for discharge)	Interpreted as discontinue whatever medications follow (typically discharge meds).	Write "discharge"
c.c. (for cubic centimeter)	Mistaken for U (units) when poorly written.	Write "ml" for milliliters
A.S., A.D., A.U. (Latin abbreviation for left, right, or both ears) O.S., O.D., O.U. (Latin abbreviation for left, right, or both eyes)	Mistaken for each other (e.g., AS for OS, AD for OD, AU for OU, etc.)	Write: "left ear," "right ear" or "both ears;" "left eye," "right eye," or "both eyes"

JCAHO has created a set of Frequently Asked Questions (FAQs) that explain the new requirements in greater detail. Visit

www.jcaho.org/accredited%2Borganizations/patient%2Bsafety/04%2Bnpsg/04_faqs.htm.

In addition, the Institute for Safe Medication Practices (ISMP) has published a list of dangerous abbreviations relating to medication use that it recommends should be explicitly prohibited. It is available on the ISMP Web site: www.ismp.org.

Additional background information on medical errors:

The problem of medical errors has been highlighted over the years, including by Dr. Lucian Leape and most recently in a report from the U.S. Institute of Medicine. In its 2000 report "To Err is Human," IOM defined an error as the failure of a planned action to be completed as intended -- that is, an error of execution; or the use of a wrong plan to achieve an aim -- that is, an error of planning.

IOM found that latent errors or system failures pose the greatest threat to safety in a complex system because they lead to operator errors. These failures are built into the system and present long before an error occurs. They may be difficult for the people working in the system to identify since they often are hidden in computers or layers of management and because people become accustomed to working around the problem.

Discovering and fixing latent failures and decreasing their duration are likely to have a greater effect on building safer systems than efforts to minimize errors at the point at which they occur.

For additional information of clarification on dietetics professionals' roles and responsibilities in ensuring patient safety, contact Ellen Pritchett, ADA's Director of Quality and Outcomes at epritchett@eatright.org.