Medication Administration

Inservice Approved for Six (6) CEUs by the
North Carolina Division of Health Service Regulation (DHSR)

This inservice is produced by Moffitt Healthcare to meet the yearly Medication Administration inservice state requirement for assisted living facilities

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Major Sections

Purpose and Need for Medications
Six Rights of Medication Administration Routes
for the Administration of Medications Common
Medication-Related Abbreviations
Infection Control and Medication Administration Vital
Signs and Medications
How to Avoid Medication Mistakes
Med Administration Policies and Procedures
Commonly Prescribed Categories of Medications
Diabetes and Insulin Management

Objectives

1. State the difference between desired and undesired effect of a medication
2. Understand the difference between a side effect and an allergy
3. Verbalize the six rights of medication administration
4. Name the routes by which an unlicensed person may give medications
5. Recognize common medication-related medical terms by their abbreviations
6. Name the five steps that make up the pathway to infection
7. List ten body fluids that could carry a blood-borne pathogen
8. Name five practical steps one could take to help minimize the spread of infection
9. Give two examples where a medication could affect vital signs
10. Know the normal ranges for temp, pulse, respirations and blood pressure
11. List five examples of medication errors
12. Give ten steps to reduce the chance of making a medication error
13. Understand how to harmonize state rules and regulations with facility policies
14. Identify common medication categories
15. Explain the difference between hyperglycemia and hypoglycemia
16. Name at least three signs or symptoms of hyperglycemia and hypoglycemia
17. Explain the steps to performing a fingerstick blood sugar check
18. Name the five general types of insulin
19. Verbalize understanding of insulin injection technique and insulin injection sites
20. Explain three ways to ensure infection control in the diabetic when giving meds

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Purpose and need for medications

In a state of perfect health, medications are not needed. However, our world is not perfect and our bodies aren't perfect, either. Sometimes a part of the body does not function the way it should. Medications are given with the hope or expectation that the body will work properly.

There are numerous ways medications can be taken. They can be inhaled, sniffed, injected, swished and spit out, rubbed in, dropped in, sprayed on, stuck on, infused, transfused, swallowed, inserted, and so on. Regardless how the drug is taken, once a drug is given there are several possible outcomes. At least one of the following will happen:

1. The medication will have the desired effect
2. The medication will not have the desired effect
3. The medication will have an undesired effect
4. The medication will interact with other drugs, food or other chemicals

Desired effect

First, a medication can have the desired effect. The desired effect is the reason why the drug would be given in the first place. There are several reasons why medications are prescribed or taken. They are listed below.

1. *Promote health* (the med can help keep the body functioning properly and ward off disease, such as taking aspirin once a day to reduce the risk of a stroke)
2. *Reduce symptoms* (like taking Tylenol for a headache, or hydrocortisone cream to decrease itching)
3. *Heal a disease or illness* (for instance, taking an antibiotic to fight an infection)
4. *Control or alter a behavior* (drugs for psychotic or socially unacceptable behavior, antidepressants, antianxiety medications)
5. *Control a disease* (illness is not eliminated, only managed, such as with blood pressure drugs, diabetes meds, etc.)

Not desired effect

This is different than merely having an undesired effect. Maybe the drug given for pain relief was helpful, but only partial relief was obtained. The desired effect, total pain relief in this case, was the goal, but not fully accomplished. Medications without the desired effect might not be effective at all, or be only partly effective.

Another example of the desired effect not being obtained would include sub therapeutic levels of Digoxin for heart arrhythmia or PT/INR being too high after an adjustment in the Coumadin dosage. End results from drugs such as these often don't go far enough or they go too far.

Undesired effect

Drugs in this category cause signs or symptoms that we call *side effects* and *allergies*. A side effect can be either an expected or unexpected consequence of taking a drug. For example, it is commonly known that sublingual nitroglycerin, given for acute chest pain (angina), often causes both a drop in blood pressure and a headache, due to its vasodilation effects.

Whereas the side effects of nitroglycerin are expected, they are still undesired. What makes them expected is that they are predictable. You would expect there to be a reasonable chance of the side effect happening. Constipation when taking narcotic meds or iron supplements is another example of an undesired, yet predictable, effect. Perhaps the most commonly listed side effects of medications in general are the "GI triad" symptoms of nausea, vomiting or diarrhea.

An unexpected side effect is one that you don't think (or would predict) is going to happen. They can be obscure or rare (at least to unlicensed med techs), as in a chronic cough when taking an ACE inhibitor blood pressure med, or an atypical reaction (opposite of what you would expect) where a resident becomes more agitated after starting an antianxiety drug.

One important note about the difference between a side effect and an allergy is that a drug is often continued despite the presence of the side effect, if the benefits of the med outweigh the problems caused by it. However, side effects can often be severe enough that the drug has to be discontinued or changed in dose, strength or frequency in order to lessen those unwanted effects.

Allergic reactions are common in all age groups. A true allergy develops as the body responds in initiating a chemical chain reaction in dealing with what the body perceives as a foreign threat. An allergy to a substance is normally created in one of two ways:

1. First time exposure to the substance (medication, food, etc.) causes the body to manufacture an antibody (IgE). You won't have the reaction at this point. However, future exposures activate the IgE to cause your white blood cells to release histamine, which causes the allergic reaction.
2. An allergy can also happen without the body first making the IgE antibody, but the mechanism behind this is complex and poorly understood.

The most common allergic reactions are hives and rashes. Penicillin and related antibiotics are the most frequent culprits. The cause of hives not induced by a medication is usually hard to pinpoint.

An allergy is essentially a side effect that will usually negate the use of the medication. The unwanted effects of the drug are such that there is high risk for harm or death to the resident. Here are some examples of an allergy response:

1. Resident becomes short of breath or develops angioedema (puffy face, lips or tongue) or rash after starting an antibiotic for a urinary tract infection
2. Asthma or hives after taking aspirin
3. Severe skin reaction and rash when taking Dilantin

The most important and immediately life threatening allergic reaction is *anaphylaxis*, or anaphylactic shock. This condition is marked by a combination of several symptoms, which could include swelling of the face, lips or tongue, rash, asthma-like attack with difficulty breathing and wheezing, chest or throat feeling tight, and rapid or irregular heartbeat. Anyone experiencing this condition needs immediate emergency care.

Anaphylaxis usually happens within the first hour (often within minutes, even seconds) of taking the medication. However, the condition could occur up to four hours after taking the first dose of the drug.

If you notice what you think could be an allergic reaction to a medication, please report the incident immediately! You should follow the facility's policy and procedure in obtaining vital signs, notifying the physician, documentation, and all other interventions as appropriate.

Drug-on-drug interactions

The vast majority of residents in assisted living are on multiple prescribed medications. When two different meds are taken (does not have to be the same time of day) the chemicals from those meds can cause conflict with each other. One study has shown that a person who takes six medications has at least an 80% chance for a drug-on-drug interaction. The more medicines a person takes, the more likely drug-on-drug interactions will occur.

Fortunately, most such interactions are benign. Frequently, the effects of one drug on another are not noticeable and no known harm comes to the resident. But keep in mind that although you might not notice any problem, the interaction could be interfering with treatment. This is especially true when one drug counters, or decreases, the effects of another drug.

Other drugs "potentiate" or increase the effects of other medications. A classic example of this is the increase in PT/INR lab results when the resident is taking aspirin along with Coumadin. Both aspirin and Coumadin interfere with clotting time. Please note that foods are a common source of drug interaction problems. Cranberries increase Coumadin's effectiveness, while high vitamin K foods, like broccoli, kale and spinach, decrease it.

Six rights of medication administration

There are inherent rights a resident has in the taking of medications. It is the responsibility of the person who gives the meds to ensure that these rights are being met.

Right resident

Always make sure that you identify a resident before you administer any drug. Follow your facility's policy in the identification process.

There are several ways that you can properly identify the resident. Ideally a picture of the resident would be in the MAR. But it can risky if you rely only on a picture if you don't know what the resident looks like. Many pictures are not kept current and the old photograph might not look enough like the resident currently does to remove all doubt.

You could ask a coworker to identify the resident. This is especially important if you are new to the building or unit or area. Also, check for an arm band or other personal identification, such as allergy bracelet. Ask the resident what his or her name is. However, this could be a problem for those who have dementia or are otherwise confused. Avoid distractions and never guess. Don't ever assume that a person in a room is the resident you seek, especially in Alzheimer's units, as wandering residents often go in the rooms of others. Avoid making the medication error of giving a medication to the wrong resident by identifying the resident first.

Right drug

Make sure that you are giving the right drug to the resident. Be certain that the MAR you are viewing shows the intended resident. If the MAR has more than one , verify the resident's name on each and every .

Once you are certain that the MAR is for the proper resident, compare the drug containers to the MAR as you pull them from the drug cabinet. Compare the resident's name and drug between the MAR and the drug container several times, again following your facility policy and procedure.

Right dose

Checking to ensure the right dose actually involves verifying the correct dose and strength. There is a difference between the two. The strength of a drug is how much of the chemical is in a particular unit. For example, if a doctor's order is written as Tylenol 650 mg ii PO q 4 hours PRN for pain, the strength (or unit dose) is 650 mg, as there are 650 milligrams of the medication in each tablet. However, since the order calls for two tablets, the total dose is for 1300 mg (650

mg x 2 tablets).

Right route

Very many medications can be given more than one route. Antibiotics can be given IV (intravenously, through the veins), by mouth, and with a shot into the muscle. Pain meds can be given as a shot, through an IV, by inhalation, a patch, an epidural, in a cream, and others.

Obviously, unlicensed personnel can give medications only through specific, approved routes. In any case, the route that a drug is to be given must be included in an order.

You will often see orders that don't include a route. When that is the case, the oral (PO) route is assumed. This is because the oral route is usually (but not always) the only route the drug in question can be given. Mylanta and Milk of Magnesia are two common examples. However, it is still important that the route be listed on the prescribing order. If you are in doubt as to the route, you must call the prescribing healthcare provider for verification.

Right time

Drugs listed on the resident's MAR will indicate the proper times for giving the med. Those times are usually set forth based on time frames covered in the facility's policy. Giving a medication outside the time frames as set forth by the state constitutes a med error.

Routine medications (meds that have a set schedule) are to be administered within 1 hour before to 1 hour after the ordered or scheduled time, unless prevented by emergency. Documentation should record person who prepared the medication if it's not the same person who administered it.

PRN medications do not follow the "one hour before to one hour after" ruling. PRNs must be given no earlier than the next due time. For example, let's say you have a resident who can have a PRN Albuterol nebulizer treatment q 6 hours for shortness of breath or wheezing. Suppose he was given a treatment at 1:30 p.m. The next time he can have this neb treatment is 7:30 p.m., which is 6 hours past the last given dose (1:30 p.m. plus 6 hours). He cannot have this treatment one hour before the six hours is up. All PRN orders are treated in a similar manner.

Right to refuse

It is the resident's right to refuse any medication or treatment. If a resident refuses to take a prescribed treatment, try to find out why he is refusing. Although you cannot make him take the med, you can attempt to persuade him to do so. As part of your persuasion, talk with the resident about possible negative consequences to their body if the med is not taken. You must document any refused treatment according to facility policy.

Routes for the Administration of Medications

Individuals who are not licensed by the state's occupational licensure laws can administer medications by the following routes:

1. Oral
2. Topical (including ophthalmic [eye] and otic [ear] medications)
3. Inhalants
4. Rectal (suppositories and Fleets enema are examples)
5. Vaginal (suppositories, creams, and douches are examples)
6. Subcutaneous injections (excluding anticoagulants, such as heparin)
7. Gastrostomy tube medications
8. Nebulizer medications

Oral

The oral route is by mouth, often written as "PO". The vast majority of drugs are taken by mouth. In some med orders, it is understood that the medication is to be given by mouth if the order does not specifically call for it. For instance, an order like "Mylanta 30 cc q 4 hours PRN for nausea" would be understood as given by mouth, even though the order does not specifically say so, because the oral route is the only route this drug is given. If there is any question as to the route, the prescribing healthcare professional must be contacted for clarification.

Topical

Topical drugs are those that are placed on the surface of the body. The consistency of such drugs could be a gel, liquid, cream, powder, spray or patch. Most topical meds go on the skin in a very local area and the order will often note where the drug is to be placed. In the event of a general pain patch, sites are usually rotated. Ear drops or ointment (otic meds) and eye drops or ointment (ophthalmic meds) fall in the topical category. This route is quite common in assisted living.

Inhalants

Inhalants are medications that are inhaled into the respiratory system. They include drugs that can be breathed in through the mouth and the nostrils. Drugs given by this route are usually ordered to treat asthma or COPD (chronic obstructive pulmonary disease). An inhaler or puffer is the device that usually delivers the aerosol spray. Inhalants are separate from nebulizer treatments, which are more complex and take specialized equipment.

Rectal

Rectal medications are given into the rectum, which is the last pouch of large intestine just before the opening, or anus. Meds given in this area include creams, suppositories, gels, ointments or enemas. Some of these consistencies are applied only to the surface, while others are placed into the rectum. Administration of suppositories or enemas requires specific training and is monitored through LHPS (Licensed Health Professional Support).

Vaginal

Vaginal medications are given into the vagina and include creams, suppositories, ointments, gels, jellies, aerosol foams and douches. A wide variety of drugs can be administered to this site. As with the administration of rectal meds, follow proper infection control measures and use proper technique. Assure resident privacy any time a drug is given by this route.

Administration of suppositories and douches requires specific training and is monitored through LHPS (Licensed Health Professional Support).

Subcutaneous

A subcutaneous (sq) drug is one that is given into the fat underneath the skin. Insulin is by far the most common drug given this route to assisted living residents. Since the sq route is often used on a routine basis and requires a needle puncture, sites are rotated. The most common sites that can be used for sq injections include the abdomen, backs of the upper arms, and front/lateral thighs. The abdomen and backs of the upper arms are used the most due to the presence of more subcutaneous tissue and ease of access.

Other meds that unlicensed caregivers can administer the sq route include vitamin B12 and Procrit, a medication that helps build up red blood cells. You must understand that different facilities have different policies as to which of these you can administer. Always follow your agency's policies and procedures. It is also important to understand that unlicensed personnel under no circumstance can give anticoagulants, such as heparin or Lovenox. Giving a drug for which you are not trained or which is not allowed by law is grounds for immediate job termination.

Administration of injectable medications requires specific training and is monitored through LHPS (Licensed Health Professional Support).

Gastrostomy

"Gastro" refers to the stomach. A gastrostomy tube medication is a liquid drug that is given through a "g-tube," which is a tube that goes directly into the stomach through the abdominal wall. It is often called a feeding tube (though there is another type of feeding tube—the nasogastric tube passed through the nose) and is sometimes used when the resident is not able to take in sufficient nutrition by mouth.

Administration of feedings, flushes, or meds by this route requires specific training and is monitored through LHPS (Licensed Health Professional Support).

Nebulizers

A nebulizer treatment is a drug given by a nebulizer, which is a machine that takes a liquid drug and creates an aerosol, or vapor, which can then be inhaled into the lungs. Nebulizer drugs, like most others, can be given either on a routine basis or a PRN basis. The most common reason that nebulizer treatments are given is for COPD (chronic obstructive pulmonary disease).

Administration of nebulizer drugs requires specific training and is monitored through LHPS (Licensed Health Professional Support).

Common medication-related abbreviations

Long-term care facilities see thousands of orders and documentation data each year. Abbreviations make it easier to document common or repetitive words. There are many standard abbreviations that are commonly used. Some of them are listed below:

General

1. MAR = Medication Administration Record
2. OTC = over the counter
3. SIG = label
4. VS = vital signs
5. WT = weight
6. UA (or U/A) = urinalysis
7. Pre = before
8. Post = after
9. O2 = oxygen (So listed because oxygen atoms in the oxygen we breathe pair up together, two atoms of oxygen making up a double atom molecule.)
10. NPO = Nothing by Mouth (Often ordered for certain special procedures, test or surgery scheduled that day; the resident cannot eat or drink for some hours beforehand.)
11. EC = enteric coated, med won't dissolve in stomach (Drugs without the "ec" on the label must not be given if "ec" is part of the written order. For instance, enteric coated aspirin is NOT the same as regular aspirin. It is a medication error to give regular aspirin if the enteric coated type is ordered. The enteric coated drug will be less likely to cause gastric upset or bleeding.)

Routes of Administration (Note: Not allowable for unlicensed personnel identified with an *)

1. PO = by mouth
2. PR = per rectum
3. OD = right eye
4. OS = left eye
5. OU = both eyes
6. AD = right ear
7. AS = left ear
8. AU = both ears
9. SL = sublingual (under the tongue)
10. IM = intramuscular*
11. ID = intradermal*
12. SQ = subcutaneous (only certain meds allowed)
13. IV = intravenous*

14. GT = gastrostomy tube
15. Per = “through” or “by”

Dose

2. mg = milligram (A thousandth of one gram, it takes 1,000 mg to make 1 gram)
3. mcg = microgram (A millionth of one gram, it takes 1,000 mcg to make 1 mg and 1,000,000 mcg to make 1 gram)
4. CC = cubic centimeter (It takes 2.54 centimeters to make 1 inch, so roughly 16 cc per cubic inch)
5. ml = milliliter (Same size in volume as “cc” it takes 1,000 ml to make 1 liter, which is just over 1 quart)
6. L = liter (1,000 ml, just over 1 quart)
7. Tsp = teaspoon (It takes 3 teaspoons to make 1 tablespoon)
8. Tbsp = tablespoon (4 tbsp make ¼ cup)
9. gtt = drop
10. SS = ½
11. oz = ounce
12. mEq = milliequivalent (most often seen in potassium supplements)

Times

1. Q = every
2. Q d = every day
3. Q pm = every evening
4. Q week = every week
5. Q month = every month
6. Q 2h = every 2 hours
7. Q 4h = every 4 hours
8. Q 6h = every 6 hours
9. Q 8h = every 8 hours
10. Q 10h = every 10 hours
11. Q 12h = every 12 hours
12. BID = twice a day
13. TID = three times a day
14. QID = four times a day
15. QOD = every other day
16. AC = before meals
17. PC = after meals
18. HS = at bedtime (“**H**our of **S**leep”)
19. PRN = as needed
20. ASAP = as soon as possible
21. Stat = immediately

Infection control and medication administration

Medications should be administered using infection control measures, such as hand washing, gloves, and other interventions, to help prevent cross-contamination and promote a sanitary environment.

What is an infection?

The human body is equipped with an impressive and complex immune system. The job of the immune system is to help keep micro organisms in check. "Microbes" include a number of microscopic life forms, including viruses, prions, bacteria, spores, fungi, protozoa, or other parasites.

The organism, if it grows and multiplies, can overwhelm the body's defenses. The point at which the organism harms or could harm the body, causes illness or causes signs or symptoms of reaction is called an infection.

How infections occur

Before an organism can cause an infection in a human being, it has to find access on or in the person. There is a series of steps that make up the pathway to infection. They are:

1. *Pathogen* (Also called a "microorganism," which is the disease-causing life form that needs a host or medium to multiply.)
2. *Portal of exit* (The microbe has to have a way to leave the host or reservoir. In the case of a common cold, for example, a virus would be the pathogen and the portal of exit could be the carrier's mouth.)
3. *Transmission* (The virus could be spread by sneezing.)
4. *Portal of entry* (There must be a way for the pathogen to get on or in a person, in this case, the nose of the second person when he breathes in the airborne virus particles.)
5. *Susceptible host* (As the person breathes in the virus, and if the virus is able to gain a "foothold" and colonize, an infection results.)

What is infection control and universal or standard precautions?

Infection control, at its simplest, is just as the term implies – controlling infection so that infection does not happen or is contained. Your facility will have policies and procedures that address how to prevent or control the spread of *nosocomial* infections, which are those acquired in healthcare institutions.

Infection control includes prevention, disposal of soiled products, cleaning or sterilizing reusable supplies, employee and resident vaccines, and monitoring.

It is important to understand that infection control works both ways. You want to protect both you and the other party from becoming infected. If one party already has an infection, proper measures will help prevent the spread of infection.

Universal precautions are the practical steps we take to help ensure infection control. The term was born in the 1980s as a result of the AIDS crisis. The idea behind universal precautions is based on the fact that any type of body fluid could be a reservoir for pathogens. Body fluids include:

1. Blood
2. Saliva
3. Wound secretions
4. Semen
5. Vaginal secretions
6. Tears
7. Lymphatic fluid
8. Urine
9. Feces
10. Nasal mucous
11. Sputum
12. Bile
13. Breast milk
14. Gastric juice/vomit
15. Sweat

Many healthcare employees are dismayed at not being told which residents could possibly have certain infections, such as HIV or hepatitis. They feel that if they knew which residents carried these feared pathogens, they would practice better infection control. However, precautions you should practice universally (hence, universal precautions), among all residents at all times, will help safeguard you no matter what pathogens you are likely to run into.

Exposure

Exposure to a pathogen or microorganism refers to a state in which you are suddenly at a much higher risk of getting the infection. You will recall that in the section above on *How infections occur,* there are five steps in the infection process: pathogen, portal of exit, mode of transmission, portal of entry, and susceptible host. If the first four steps have been crossed, you have been exposed.

It's important to remember that how you are exposed depends on the pathogen. Let's take two examples: tuberculosis (TB) and hepatitis B (HBV—hepatitis B virus). TB is an airborne illness,

which means that this bacterium is spread by air. You don't get it by touching the person. If you are in a room or close to an active TB patient and he is coughing or sneezing, and you are not wearing a mask, you have been exposed. Here are the steps to spreading TB:

1. Pathogen: tuberculosis
2. Portal of exit: mouth/nose (coming from the lungs of the infected person)
3. Mode of transmission: sneezing/coughing (even breathing or talking)
4. Portal of entry: nose/mouth of victim (you breathe in the air containing TB particles)

You have not been exposed until a pathogen finds a way to get in or on you. If only the first three steps were crossed, for instance, if you were not in the room or in close proximity, you are not exposed.

Now, let's look at hepatitis B. HBV is a blood-borne pathogen. That is, the virus is considered to be present in the body fluids of the carrier. The same four steps must be crossed before you would be exposed. Let's look at how you can be exposed to Hepatitis B.

1. Pathogen: Hepatitis B
2. Portal of exit: blood from wound (could be any fluid from any part of the body)
3. Mode of transmission: you come in contact with the blood when changing a dressing without using gloves
4. Portal of entry: cut, open blister, or scratch on your own hand

As you can see, exposure to a pathogen depends on several factors, especially the kind of pathogen. TB is air-borne, so exposure can happen without touching the resident. Hepatitis B, on the other hand, is a blood-borne pathogen, so it usually takes touching the resident (or otherwise coming in contact with the body fluid) in order to be exposed. Merely being in the same room does not expose you to HBV.

Being exposed to an infectious bug does not mean that you will "get the disease." It simply means that you have somehow come in contact with the pathogen. If you are susceptible and the microbe colonizes in or on your body, then you become infected.

Each resident is treated as if there is active infection present. This is the crux of universal precautions. Follow these steps to help reduce your risk of picking up a pathogen:

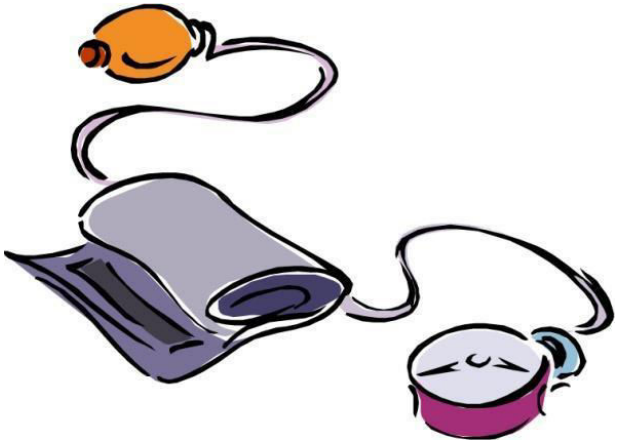
1. Wash your hands
    a. Before starting your shift
    b. After going to the bathroom
    c. After providing incontinent care
    d. Between residents as needed (at least use hand sanitizer)
    e. After coming into contact with any body fluid
    f. Before and after providing personal care
    g. After changing linens

   h. After cleaning/disinfecting equipment or supplies
   i. After your shift ends
2. Wear PPE (personal protective equipment) whenever needed, including gloves, mask, gown

   Wear gloves when:
   a. Administering injections
   b. Giving eye drops
   c. Flushing gastrostomy tubes
   d. Changing wound dressings
   e. Anytime where there is a high risk of coming into contact with body fluids
4. Clean or sterilize any equipment or device
5. Consider any offered vaccines, such as the flu vaccine or hepatitis B vaccine

Vital signs and medications

Vital signs are an important part of assessing a resident's condition. By taking vital signs you can determine many things about the person's health status. The term *vital signs* is usually meant to refer to four separate measurements:



Temperature (T)
Pulse (P)
Respirations (R)
Blood pressure (BP)

The purpose of taking vital signs is two-fold:

1. Vital signs can detect a change in normal body function.
2. Vital signs can help you see if the resident has responded to treatment.

It is important to remember that vital signs can vary somewhat during the day, depending on many factors. Therefore, try to take routine vitals when the resident is at rest and either sitting or lying. Since a physician may order medications based on changes in vital signs, it is imperative to use proper technique. Sloppy technique will result in inaccurate data and treatment based on wrong vital signs might not be as effective as would otherwise be expected.

If you have difficulty obtaining any vital sign, you should report this to the nurse or other person in charge for proper follow-up. Always record vital sign results in the appropriate place in the MAR or other record as facility policy dictates.

Temperature—*Measurement of heat production*

The bodies' temperature is the balance between the amount of heat the body is producing and how much heat the body is losing. We produce heat in exercising, digesting our food, fighting off an infection, and so on. We lose heat through breathing, elimination, by resting or sleeping.

Factors that affect our temperature

1. Exercise—will cause the temperature to rise.
2. Illness—can cause the temperature to rise, as with many infections, or to fall, as with conditions that do not cause infections. Some sudden illnesses, such as a major stroke, can cause fluctuations in the temperature.
3. Age—aging tends to lessen body temperature, due to lower metabolism and a more sedentary lifestyle. It is common to find elderly residents with temperatures in the upper 96 to mid 98 degree range.

4. Time of day—the temperature is lower earlier in the day and lowest around the time of rising from sleep.
5. Medication—some medications lower the body temperature purposefully, such as the antipyretics like Tylenol or aspirin.
   Infection—usually causes the temperature to rise. Some infections, like septic shock, may actually lower the temperature. In general, however, a fever is the single most reliable sign of infection.
7. Emotions—more tranquil emotions lower the temperature by relaxing the resident whereas stronger emotions rev up the body, causing a temporary rise in the temperature.
8. Hydration—A well-hydrated person will have a more consistent, reliable temperature, while that of the resident who is dehydrated will often be lower.
9. Environmental temperature—the immediate surroundings have a direct relationship on the person's temperature. The hotter the environment, the warmer the resident. The colder the environment, the colder the resident.

The normal body temperature of the adult at rest is 98.6^{o} (*Note*: 98.2^{o} is considered by some to be the new standard, but most authorities still use the 98.6 standard).

Pulse—*Measurement of heart speed*

The pulse is created by the surging force of blood against the walls of arteries when the heart beats. The pulse is the number of times the heart beats per minute.

Please understand that there is a difference between the *rate* and the *rhythm* of a pulse. The rate is the measurement of how fast the heart beats. The rhythm is whether the pulse is regular or irregular.

Caregivers often confuse rate and rhythm. The two are separate quantities and have no bearing on the other. The rate can be slow, normal or fast, and the rhythm can be steady (regular, like a rhythmic drum beat), or irregular (speeds up or slows down, "jerky," not steady). Always note if the pulse is irregular. If you're sometimes confused between rate and rhythm, maybe the following can help:

Rate: Slow [p p p p p p p p p]
Normal [p p p p p p p p p p p p p p]
Fast [p p p p p p p p p p p p p p p p p p p p p p p p p p p]

You can see from the example above where every "p", which stands for pulse, is evenly spaced, no matter what the speed. So, they are all regular rhythm. In the example below, notice how the irregular pulses are NOT evenly spaced. The degree of irregularity in residents could be anywhere from slightly to severely irregular:

Rhythm: Irregular [pp p pp p p p pp p pp p pp pp p p p p]

Sites where you can take the pulse

1. Radial—at the thumb side of the wrist and the most common and usually the easiest place to take the pulse
2. Carotid—on the sides of the neck and the preferred site to check for a pulse during CPR
3. Temporal—at the side of the forehead just in front of the ears
4. Brachial— at the bend of the elbow toward the inside, the same site to place the diaphragm of a stethoscope when taking a blood pressure
5. Femoral—at the crease of the groin in the upper part of the thigh
6. Popliteal—behind the knee, a difficult place to find a pulse on many people
7. Dorsalis pedis—on the top of the arch of the foot, maybe 10% of people do not have an easily detectable pulse there
8. Apical—directly over the heart on the left side of the chest, done with a stethoscope

Factors that affect the pulse

1. Age—usually decreases with age because of lower metabolism and less active state
2. Sex—women usually higher than men
3. Position—lowest when lying, a little higher when sitting, and highest when standing and especially when moving around, increases with activity
4. Drugs—some lower the pulse rate, and even the rhythm, while some raise the pulse
5. Illness—some lower the pulse, some raise it
6. Emotions—more tranquil emotions lower the pulse by relaxing the person, whereas stronger emotions rev up the body, causing a rise in the pulse rate
7. Exercise—will cause the pulse to rise
8. Elevated temperature—usually elevates the pulse rate
9. Physical training or exercise—increases the pulse while performing the activity but strengthens the heart, lungs, and muscles with resulting improvement in muscle tone, which means less work (and lower pulse) is needed to circulate blood during rest

The average pulse rates for the adult at rest are as follows:

1. General range: 60-90 beats per minute
2. Adult men: 60-75 beats per minute
3. Adult women: 70-85 beats per minute

Respirations—*Measurement of breathing*

Respiration is the entire process of breathing in oxygen, exchange of oxygen and carbon dioxide in the lungs, the uptake of oxygen by the cells and the expelling of carbon dioxide from the lungs. The respiration rate, as used for a vital sign, refers to the number of times a person breathes per minute. One breath (in and out) counts as one respiration. Breathing should be effortless, quiet, and regular.

Factors that affect our breathing, or respirations

1. Age—increases with age
2. Exercise—increases with exercise
   Position—lowest when lying, a little higher when sitting, and highest when standing and especially when moving around and increases with activity
4. Drugs—usually no effect, but narcotics depress respirations while certain other drugs could increase the rate
5. Gender—usually equal, perhaps slightly faster with women
6. Illness—increases with some, decreases or unaffected by others
7. Emotions—more tranquil emotions lower the respiratory rate by relaxing the resident whereas stronger emotions rev up the body, causing a rise in the rate
8. Elevated Temperature—usually causes a rise in respiration rate

The normal range for the adult is around 12-20 breaths per minute. Anywhere in the teens to lower-mid 20's is acceptable.

Blood Pressure—*Measurement of heart function*

The blood pressure is the measurement of the force that blood exerts on the walls of blood vessels as a result of the pumping action of the heart. Blood circulates continuously throughout the circulatory system of the body. Just as water in your garden hose pushes against the walls of the hose as water is pumped by pressure, so does blood push against blood vessels as blood is pumped by the heart.

A blood pressure measurement is recorded as two numbers. These two numbers are written as one number over or to the left of the second number, like writing a fraction. 126/74 is an example of a BP. The first (or top) number is called the *systolic* pressure. This represents blood pressure at its greatest. This is the hardest force with which the heart pumps at the time the BP is taken. The second (or bottom) number is called the *diastolic* pressure. This represents blood pressure at its lowest. Since the BP is taken starting higher up on the gauge (pressure falls as air escapes from the cuff), the higher number is always listed first, such as 116/64, or 138/82.

Factors that influence blood pressure

1. Weight—directly proportional to blood pressure, so the greater the person's weight, the more likely the greater the blood pressure
2. Sleep—inadequate rest will result in increased blood pressure
3. Age—BP increases with age because of "hardening of the arteries," less efficient body systems and disease processes, very common in the elderly, and one of the most common medical diagnoses
4. Emotions—more tranquil emotions lower the blood pressure by relaxing the resident whereas stronger emotions rev up the body, causing a rise in the blood pressure
5. Sex—tend to be higher in women

6. Race (ethnic group)—darker skinned ethnic groups tend to run higher pressures
7. Heredity—plays a great role in blood pressure, strong genetic component, difficult to overcome for many people who "do all the right things" but still have a difficult time maintaining a normal blood pressure

Normal blood pressure range for the adult

1. Systolic: 90-140 millimeters of mercury (mm/hg)
2. Diastolic: 60-90 millimeters of mercury (mm/hg)
3. A normal blood pressure range is considered to be 90/60 to 140/90. In other words, the top number should be between 90 and 140 while the bottom number should be between 60 and 90. (*Note*: Numbers occasionally just a little outside the "normal" ranges are not necessarily a cause for concern, unless other symptoms are present.)
4. There is a growing concern for the "pre-hypertensive" stage, where the person is not technically running high, but in the higher range of normal. So a person who tends to run in the 130s/80s runs a greater risk of eventually becoming hypertensive.

Blood pressure tips & techniques

1. Make sure cuff is on the upper arm and not covering the bend of the elbow.
2. The stethoscope bell or diaphragm is placed on the brachial artery, on the inside bend of the elbow, just to the inside of center.
3. It takes practice to inflate and deflate the cuff properly. Practice watching how fast or slow the needle on the dial falls as you adjust the valve to speed up or slow down the escape of air from the cuff.
4. The resident should be in a relaxed position for a more correct reading.
5. Do not take a blood pressure on an arm with an IV, dialysis shunt, cast, sore, wound, or on the side of a mastectomy.
6. Try to apply the cuff over a bare arm, not over any thick or heavy clothing.
7. You may need to get the room quiet in order to hear the heartbeat.
8. If you are using a dial gauge keep it at eye level to properly read it.
9. Strange as it sounds, know that the only purpose of the blood pressure cuff is to cut off circulation to the arm. It is necessary to inflate the cuff so that its pressure is higher than the resident's actual pressure. If you can hear the heartbeat through the stethoscope when you stop inflating the cuff, it means that you have not yet reached the resident's highest pressure. You will need to inflate to a higher pressure.
10. If you are using a manual cuff, learn to read the dial gauge correctly. Numbers are written on it in increments of 20. The longer lines are in increments of 10. The smaller lines represent intervals of 2. So the blood pressure reading should be in even numbers.

How to avoid medication mistakes

What is a medication error?

According to the National Coordinating Council for Medication Error Reporting and Prevention, a medication error is defined as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer."

There are many basic types of medication errors (there are many more than these):

1. Wrong choice
2. Wrong drug
3. Known allergy
4. Missed dose
5. Wrong time
6. Wrong frequency
7. Wrong technique
8. Drug-drug interaction
9. Wrong route
10. Extra dose
11. Failure to act on test, such as PT/INR
12. Equipment failure
13. Inadequate monitoring
14. Preparation error
15. Wrong dose
16. Meds with similar names
17. Meds with similar packaging

According to the Institute of Medicine, more than 7,000 patients and residents die each year from medication mistakes—mistakes that could have been avoided. And this does not even count the tens of thousands of injurious but non-lethal mistakes and the millions of documentation errors.

Even the lack of documentation to support giving a medication could have potential harm. The omission could later that day be seen as the resident not getting the drug, which could lead to double dosing.

According to one recent study, the top four types of med errors include:

1. Wrong time
2. Wrong dose
3. Omission of the med
4. Giving an extra dose

The first three are the most common specific errors related to the administration stage.

Stages of the medication process

There are seven stages of the medication process:

1. Prescribing
2. Transcribing
3. Dispensing
4. Preparing
5. Administering
6. Documenting
7. Monitoring

Most med techs are heavily involved in preparing, administering and documenting the drugs they give. These three steps, known by the acronym P-A-D, are the ones followed during every med pass. Most medication errors are made in these steps but errors can be made during any part of the medication process.

Prescribing

A physician, physician's assistant or nurse practitioner is the healthcare professional responsible for issuing the medication order in the first place. Errors at this stage include: prescribing a drug the resident is allergic to, no route specified, drug-on-drug interactions, and others.

Transcribing

Transcription is the act of transferring the order from verbal or written communication to the MAR or other resident record. Errors at this stage include: failure to transcribe the order as written or verbalized, failure to transcribe the order at all, failure to clarify or verify, and others.

Dispensing

It is the responsibility of the pharmacist to properly dispense, or package, the medication exactly as ordered. Errors at this stage include: wrong drug, dose, strength, frequency, time, or route, failure to fill the prescription in a timely manner, and others.

Preparing

This is the first step of three where most med techs are routinely involved in giving medications. At this stage errors include: preparation error, wrong resident, wrong drug, not checking the MAR with the drug label, precharting, and others.

Administering

This is where many of the most serious errors occur. It is the responsibility of the med tech or other person giving the medication to ensure that the drug is given safely and in accordance with all policies and procedures.

Errors at this stage include: wrong resident, wrong dose, wrong drug, known allergy, missed dose, wrong time, wrong frequency, wrong technique, wrong route, extra dose, failure to act on related test, equipment failure, giving a PRN med before allowed per order, and others.

Documenting

Whereas most of the serious mistakes are made in the preceding stage, the majority of mistakes are made in this area. Specifically, lack of documentation that supports that you did indeed give the medication is very common. It is also the easiest and quickest of all the stages of the medication process, so there is no excuse for lack of or poor documentation.

Errors at this stage include: not documenting the effectiveness of PRN meds, not documenting that you gave a drug, documenting that you gave a med when you did not, failure to note why resident refused the drug, failure to note why initials are circled, documenting in the wrong MAR, time frame, or , and many others.

Monitoring

Ongoing monitoring and assessments are vital for resident safety. Understand some basic facts about the medications you are giving, including some of the more common side effects. You do not know what to look for if you do not know anything about the medications.

Is the resident on Coumadin having any bleeding episodes, or complains of sudden shortness of breath or pain in the calf or upper leg? Does the resident show any signs or symptoms of a reaction from the antibiotic treatment that has just begun? Errors at this stage include: failure to observe for common problems and side effects, failure to document an adverse reaction; inadequate documentation of adverse reactions, failure to notify MD of reactions, failure to notify MD of lab test results, failure to document that MD has been notified, failure to follow-up on MD orders, and others.

Reasons for medication errors

Here are the main reasons why medications errors are made:

Poor communication
Drug name communication
Misinterpreting prescription information or handwriting
Lack of knowledge
Lack of concern or caring
Too busy or in a hurry
Insufficient training

Fatigue, loss of sleep, failure to follow policies and procedures, increased workload, lack of double checking, and long work shift also lead to greater numbers of medication errors.

Ironically, experienced med techs often make med errors by being experienced. It is not the experience, per se, that leads to errors, but med techs who have been on the job for some time and who work with the same residents tend to take some things for granted. They are at risk of going "by memory" instead of checking med labels against the MAR. By not being conscientious, any caregiver can make mistakes.

In a detailed 2011 study: trained medication aides made no more errors than LPNs, but others with basic training made more than twice as many errors as either trained med aides or LPNs.

What can you do to help minimize your chances of making a medication error? As you think about this question, it helps to consider some common types of mistakes and why they are made.

1. Not following the most current order
2. Failure to D/C an order on an MAR that has been discontinued
3. Not giving meds in a timely fashion after receiving the order
4. Giving a med outside allowable time frame
5. Not documenting that you gave the med
6. Documenting that you gave a med when you didn't
7. Not following the medication rights
8. Not verifying/clarifying physician's orders
9. Not following your facilities' policies and procedures
10. Giving a medication the patient/resident is allergic to

According to one recent study, 69% of all institutional setting medication errors were caused by communication problems or gaps in communication.

As if all this wasn't enough, we also have to be concerned about things we cannot control, such as how medications react once a resident takes them. According to the Dean of the State

University of New York School of Pharmacy, Wayne K. Anderson, there is an 80% chance of drug-to-drug interaction if the resident is taking 6 or more medications. Since many residents take far more than six medications, the chances of drug interaction problems is substantial. This means that caregivers who administer medications need to understand basic caregiving related to the meds they give in order to give the best care.

Guidelines for safe medication administration

There are many things you can do to help reduce the chances of making a medication mistake. It is not really difficult to avoid errors, but you must be vigilant, attentive, and thoughtful about all aspects of the medication administration process. The list below outlines some of the easy, but important, things you can do to minimize your risks.

1. Store medications in a secure area that is easy to monitor and maintain.
2. Organize medications to help you locate them easily and quickly.
3. Always store drugs according to manufacturer's instructions.
4. Look for expired medications—do not give meds that are out of date or that appear deteriorated.
5. Refrigerated medications should never be stored in the same place as food or body fluid specimens.
6. Keep a drug book handy and refer to it often.
7. Become familiar with the medications you give. It only takes a few moments each day to look up a new drug. Read about how it works, its side effects, and special nursing considerations.
8. Understand how certain meds affect vital signs.
9. Take necessary vital signs before giving some meds, such as the pulse before Lanoxin.
10. Know what standing orders are for your facility and follow them when needed.
11. Make sure the resident takes the med you administer. Legally, you haven't given the med until the resident takes it as ordered. PO meds must be swallowed, patches must be applied, etc.
12. Make sure you are giving the right amount of the right medication the right way to the right resident at the right time.
13. Do not give any medication through any route for which you have not been properly trained or which is not part of your standard of practice for your level of education, certification, or degree.
14. If you take medication orders by phone, make sure you record all necessary information, such as resident's name, date, time, medication name, dose, strength, route, frequency, your name, and person giving the order.
15. If you make an error, what you do depends on what kind of error and how serious the error is. Always follow your facility's policies and procedures.
16. Be sure to get any ongoing training you need to stay competent & confident.
17. Record errors as soon as possible after the event.
18. Understand how you committed the error and address the reasons for the error.

19. Remember the acronym *P-A-D*—Prepare, Administer, Document—always follow the proper sequence.
20. Know where any emergency medications and telephone numbers are in case of a severe medication reaction.
21. Do not pre-pour medications apart from your agency rules.
22. Do not alter prescription labels.
23. Document properly. This includes your initials when you give a med, proper notation when resident out of facility or refuses meds, reason and effectiveness of PRN meds, etc.
24. Do not pre-chart. Document only AFTER you have given the medication.
25. Verify or clarify any order that you do not understand. *Do not guess!*
26. Properly transcribe medications from verbal order sheets to the MAR.
27. Use proper medication supplies as needed, including gloves, tissue for eye drops, med cups, etc.
28. Wash your hands (or at least use hand sanitizer) between residents.
29. Follow infection control policies at all times.
30. Monitor residents who self-administer their own meds. Notify the doctor should the resident become mentally or physically incompetent to administer her own medications.
31. Be careful that your familiarity and experience with a group of residents does not lull you into becoming complacent. Be diligent about checking the MARs against drug package labels to adhere to resident's medication rights.
32. Check any newly ordered medications against the resident's listed allergies and contact prescriber for verification as needed.
33. Follow facility policies and procedures concerning faxing, calling, or otherwise acting on drug level and related laboratory reports to the physician, as med doses are often changed due to changes in test reports.
34. Promptly report any malfunctioning device or equipment related to the administration of medications, including nebulizers, glucometers, needle puncture devices, etc.
35. Many medications share similar names. Check meds carefully to avoid confusion about which drug to administer.
36. If you omit a med, do not give an extra dose at the next scheduled time. This is called double dosing and is against the law.
37. Scheduled, routine drugs have a "one hour before to one hour after" rule of thumb for administration. As an example, a med scheduled for 8 a.m. can be given between 7 a.m. and 9 a.m. Given outside this time frame constitutes a med error.
38. Do not give a PRN medication before the lawful time. The "one hour before to one hour after the scheduled time" rule does not apply to PRNs.
39. Documenting that you gave a med if you actually did not give it constitutes fraud. This can be grounds for termination of employment.
40. Medications should be given in a timely manner after receiving a new order. New or established drug orders should be quickly followed up on (spelled out in the policies and procedures) if not dispensed by the pharmacy in a reasonable time frame. It should not take multiple days between a new or refill order and the drug being on hand to give.

Medication administration policies and procedures

Assisted living facilities should have on hand policies and procedures addressing the administration of medications. You should remember that state rules and regulations related to the administration of drugs are minimal standards. That is, the facility can be more strict, but not less strict.

The administration of drugs are minimal standards. That is, the facility can be *more* strict, but not *less* strict, than the rule. Topics included in the policies should cover at least the following:

1. Medication Orders
    a. Verification of orders
    b. Parts of the medication order
    c. Verbal orders
    d. PRN psychotropic medications
    e. Miscellaneous statements
2. Medication Labels
    a. Medication label information
    b. Multiple meds labeling
    c. Altering a prescription label
    d. Labeling of non-prescription medications
    e. Transferring medications between residents
    f. Medications leaving the facility
3. Administration Of Medications
    a. Liquid medications
    b. Crushed medications
    c. Preparing medications in advance
    d. Precharting
    e. Recording medications on the MAR
    f. Medication errors and adverse reactions
    g. Medication supplies
    h. Borrowing medications
4. Self-Administration Of Medications
    a. Requirements for self-administration
    b. Rescinding self-administration orders
5. Medication Storage
    a. Storing self-administered medications
    b. Facility storage of medications
    c. Accessibility to locked storage areas
    d. Storing medications meant for external use
    e. Stocking non-prescription medications

6. Medication Disposition
    a. Releasing medications
    b. Destroying medications

7. Controlled Substances
    a. Record of controlled substances
    b. Storing controlled substances
    c. Returning or destroying controlled substances
    d. Drug diversions

1. Medication Orders

Verification and clarification of orders

There are occasions when you will need to contact the physician or other healthcare provider if you do not understand an order. This is most likely to occur when a resident:

1. Is first admitted to your facility
2. Returns to your facility from a hospital or rehab stay
3. Returns from a visit with the doctor
4. Returns from a visit to the ER
5. Has conflicting orders from different physicians or other healthcare providers

Also, if any of the following conditions apply, the facility should contact the physician to verify or clarify a resident's medication orders:

1. If the FL-2 is not signed and dated within 24 hours of admission
2. If any medication order is not clear or complete
3. If you receive more than one of the same type of form and the orders are not the same

It is important that you document any verification or clarification of physician's orders in the resident's record. Note how communication was made, whether by fax, phone call or face-to-face communication.

Parts of the medication order

Many medication mistakes are caused by incomplete orders or guessing without clarification and verification. A medication order should contain the following information:

1. Medication name
2. Strength
3. Dosage
4. Route of administration
5. Frequency
6. Specific directions for use, if indicated
7. If PRN, indication for use
8. Resident's name

A common occurrence is for the resident's name to be missing from the order. Each order should be able to "stand alone," that is, if the record was somehow separated from the chart, it should be apparent what resident the order refers to.

Verbal orders

Verbal orders are taken over the phone or from face-to-face communication with the doctor, physician's assistant or nurse practitioner. Verbal orders can only be taken by staff members in accordance with the facility's policies and procedures and should meet these conditions:

1. The order should be accepted by staff members who are responsible for the administration of the medication or someone authorized by appropriate laws
2. The order must be signed (or initialed) and dated by the person taking the order
3. The order must be countersigned by the physician within 15 days of the date the order was received

PRN psychotropic medications

Psychotropic medications are a special group of medicines. Because of the nature of these drugs, there are certain documentation requirements that must be met before they can be given. These requirements, listed below, must be noted in the medication order or included in the resident's care plan with input by a registered nurse or pharmacist:

1. Exact dose
2. Time frame between doses
3. Maximum dose the resident can have in a 24 hour period
4. Behavior specific instructions, including symptoms that might require the use of the medication

Miscellaneous statements

There are a few other important requirements about medication and treatment orders that you should be aware of.

1. All orders for medications, whether prescription or non-prescription, must be kept in the resident's record and maintained in the facility.
2. All orders for treatments must be kept in the resident's record and maintained in the facility.
3. All standing orders must be for individual residents and must be dated and signed by the prescribing practitioner.
4. All current orders and treatments must be reviewed and signed by the medical practitioner no less often than every six months.
5. The facility is responsible to assure that personal care assistants and their direct supervisors receive yearly training regarding the desired effects and side effects of psychotropic medications and maintain documentation of training in the facility.

Medication Labels

Medication label information

Every medication should have affixed a label that contains certain types of information. This will help verify what, when, and how much of the med the resident should take and help reduce the chance of a medication error. The label should contain the following information:

1. Resident's name
2. Most recent date drug was issued
3. Prescriber's name
4. Medication name, concentration, and quantity dispensed
5. Prescription serial number
6. Clear, unabbreviated directions for use
7. Generic equivalency if brand other than one prescribed is dispensed
8. Expiration date (unless single unit or unit dose already states)
9. Name, address, and phone of pharmacy dispensing medication
10. Name and initials of pharmacist
11. Any other statements medication might require

Multiple meds labeling

All medication systems where at least two solid, oral meds are packaged or dispensed together must have a label in compliance with the immediate above section. Each medication must have a description and identifying attribute of each medication contained in the system.

Altering a prescription label

Only a licensed pharmacist or dispensing practitioner can alter a medication label. The facility is responsible to make sure that the pharmacy relabels the ordered medication when there is a change in directions related to the medication. The facility is also responsible for policies and procedures for following changes in directions until the medication can be properly relabeled.

Labeling of non-prescription medications

All non-prescription medications must have a clearly visible manufacturer's label with expiration date, or an affixed label from a pharmacist or dispensing practitioner. Non-prescription medications that are stored in the original manufacturer's container must have at least the resident's name on it in such a way as not to interfere with other information on the container. It is permissible for facility staff to write the resident's name on the container.

Transferring medications between containers

No medications, whether prescription or non-prescription, can be transferred to other containers, except when preparing the medication for administration.

Medications leaving the facility

All prescription medications that leave the facility must remain in the container as packaged and labeled by the licensed pharmacist or other dispensing practitioner. All non-prescription meds that are not in packaged or labeled containers as prepared by a pharmacist or dispensing practitioner must stay in the original container and clear instructions for use must be provided. The facility must make sure to document all medications, including amount, that leave and return to the facility.

3. Administration of Medications

Liquid medications

Liquid medications, including those that need to be reconstituted (for example, a powdered drug to be mixed with a liquid), should be prepared only immediately before administering.

Crushed medications

Medications that should be crushed are to be done so only right before administering the med.

Preparing medications in advance

The following rules must be observed for preparing medications in advance:

1. Only routine, solid, oral medications can be prepared in advance and no more than 24 hours in advance.
2. Medications in sealed packages, such as unit dose, are kept sealed until time of administration.
3. Medications not dispensed from a sealed and labeled package or container will be kept in package until time of administration.
4. A separate, labeled container is used for each resident.
5. Containers are placed on tray or other object that is clearly labeled for time of administration and kept locked and only accessible to appropriate staff.

(*Note*: The state allows facilities to give medications in advance in some circumstances. But many facilities do not allow for any advance med preparation. In such cases, follow the facility's stricter rules. There should be a policy and procedure in the facility to address whether or not advance med prep is allowed.)

Precharting

Three main phases of medication administration can be remembered by the acronym, *PAD,* Prepare, Administer, and Document. This order must be followed. Preparing the medication comes first, then giving the med, and lastly, documentation.

Precharting is prohibited. *Precharting* is the documentation of giving the medication before it was actually given. You must give the med before you document that you gave it, since documentation means that you prepared and gave the medication. Documentation should occur only after staff has administered and verified resident taking medication, and before next resident's meds are given.

Recording medications on the MAR

MAR documentation is a common source of preventable medication errors. Missing documentation is one of the most often cited errors. These elements should be documented on the MAR:

1. Resident's name
2. Name of medication
3. Strength, dose or quantity of medication
4. Instructions for administering medication
5. Reason or justification for PRN medications
6. Date and time of medication administration
7. Documentation of any omissions, refusals, oversights, double dosing, etc.
8. Name or initials of person administering medication (if initials, name should appear in appropriate place in the MAR, usually on the back side)

Medication error documentation

Specific things you would do in the event of a medication error depend on what kind of error was committed and how serious it was. At least these points should be observed:

1. Notify your supervisor and physician or other appropriate health professional as indicated, depending on the type of error.
2. Document the type of error, whether refusal to take the med, unavailability of med, double dose, wrong medication, wrong resident, etc.
3. Follow facility policies and procedures related to error, including your response and interventions undertaken.

Medication supplies

Medication supplies that will enable staff to administer medications accurately and safely should be on hand in the facility at all times. This includes supplies in keeping with infection control policies. Graduated medicine cups, paper medicine cups, hand tissue, sanitizer, gloves, masks, lubricating gel, oxygen and nebulizer equipment, insulin syringes and related diabetic supplies are just some examples.

Borrowing medications

A resident's medication is nontransferable except in case of emergency. In such a case, the borrowed medication should be quickly replaced. Borrowing and replacing medications should be properly documented.

4. Self-Administration of Medications

The majority of residents in assisted living facilities require staff oversight for the proper use of medications. However, some residents are able to take their drugs independently. Such residents *self-administer* their own meds. Periodic and routine evaluations should be done to ensure that those residents can safely give themselves their medications.

Requirements for self-administration

1. Physician or other legally authorized person orders self-medication
2. Specific instructions are printed on the medication label
3. Resident is mentally competent and physically able to self-administer

Rescinding self-administration orders

There are times when a person who self-medicates is no longer judged to be able to do so safely. In such cases, the order to self-medicate should be rescinded, or discontinued. The physician should be notified for possible discontinued self-administration of meds if the resident:

1. Becomes physically unable or mentally incapable to self-administer
2. Becomes non-compliant with physician's orders
3. Becomes non-compliant with the facility's policies and procedures

The right to refuse medications is inherent in self-administration as well as staff-assisted administration. Simply refusing meds does not imply that the resident is unable to administer his or her own medications.

5. Medication Storage

Storing self-administered medications

The facility should have policies and procedures regarding the storage of medications in the resident's room. Medications in such rooms should be stored according to those policies.

Facility storage of medications

These rules should be followed for storing medications that facility staff will administer:

1. Except when under the direct or immediate physical supervision of a staff member in charge of administering the medication, all meds, whether prescription or nonprescription, including those that need to be refrigerated, must be stored in locked security in a safe manner.
2. Med storage areas should be well-lighted, well-ventilated, kept clean, and large enough to safely store medications in an organized manner. The medication storage area should not be in a kitchen, bathroom, or utility room.
3. Medication carts should be clean and meds therein should be stored in an orderly manner.
4. Refrigerators storing appropriate medications must be maintained at 36 to 46 degrees F, or 2 to 8 degrees C.
5. All medications or medication-related items that are stored in a refrigerator where other non-medication or medication-related items are being kept must be stored in a separate container. The container must be locked, unless the refrigerator or med storage area is locked.

Accessibility to locked storage areas

Only staff members who are responsible for medication administration, the person in charge, or the administrator shall have access to locked medication storage areas.

Storing medications meant for external use

Ophthalmic (eye), otic (ear), and transdermal (on the skin) medications may be stored with oral and injectable medications. All other types of topical and external medications must be stored in their own designated area, separately from oral and injectable meds.

Stocking non-prescription medications

The facility may keep a stock of non-prescription medications on hand, as well as the following items as used for common or general use:

1. Irrigation solutions in single unit quantities greater than 49 ml, and other related agents
2. Diagnostic agents
3. Vaccines
4. Normal saline or water used for injection

6. Medication Disposition

Medications are the sole property of the resident. Medications must not be shared with other residents and cannot be given to or shared with staff members.

Releasing medications

When a resident is discharged from the facility, medications with a current MD order to continue the meds will be released to or with the resident.

Destroying medications

The following apply to disposing of medications under specific circumstances:

1. All medications (except for controlled meds that are discontinued, expired, deteriorated, or those belonging to a deceased resident) must be kept separate from currently used medications until disposed.

2. Except for controlled drugs, all medications must be destroyed by the facility or returned to the pharmacy within 90 days of the date the drug expires, is discontinued, or the resident dies.
3. Medications destroyed at the facility must be done so by the administrator or a person of the administrator's choosing and witnessed by the pharmacist, dispensing practitioner, or person designated by the practitioner.
4. Medications destroyed at the facility must be done in such a way as to prevent someone from selling, using, administering, or giving away the meds.
5. Medications destroyed in the facility or returned to the pharmacy must be documented and the record must be retained in the facility for at least one year. The record must contain the following information:
    a. Resident's name
    b. Name and strength of the medication
    c. The amount destroyed or returned
    d. How the medication was destroyed (if it was destroyed)
    e. The dispensing practitioner or designee
6. Any medication in the facility that was prepared but not administered or accidentally contaminated must be destroyed at the facility according to the facility's policies and procedures.

7. Controlled Substances

Record of controlled substances

The facility must keep on hand an easily accessible record of the receipt, administration, and disposition of controlled medications. These records must be kept with the resident's record in a way that allows easy comparison.

Storing controlled substances

Controlled medications can be stored in a common container or location. Schedule II medications stored together in a common location must be kept under double lock.

Returning or destroying controlled substances

1. Controlled medications must be destroyed by the facility or returned to the pharmacy within 90 days of the date the med expires, is discontinued, or the resident dies.
2. The facility must document the following related to destroying or returning controlled drugs:
    a. Resident's name
    b. Name, strength, and dose of the drug
    c. Amount of the drug returned
3. If the pharmacy will not accept return of controlled medications, the facility must ensure destruction of the med by either the administrator or another person designated by the administrator. The pharmacist, dispensing practitioner, or person designated by the practitioner must witness this.
4. Medications destroyed in the facility or returned to the pharmacy must be documented and the record must be retained in the facility for at least one year.
5. Any controlled medication that has expired, been discontinued, deteriorated, not given due to resident death, or otherwise not given must be stored in a locked area apart from currently used medications until disposed of.
6. Any controlled medication in the facility that was prepared but not administered or was accidentally contaminated must be destroyed at the facility. Documentation should be made on the MAR or the controlled substance record showing the following:
    a. Time
    b. Date
    c. Quantity
    d. Manner of destruction
    e. Initials or name of person who destroys the med

Drug diversions

1. It is the responsibility of the facility to report any drug diversion to the following as required by law:
    a. Pharmacy
    b. Local law enforcement agency
    c. Health Care Personnel Registry
2. The facility must report to the pharmacy any suspected drug diversion.
3. The facility must document the action taken.

Commonly Prescribed Categories of Medications

In long term care, many medications are administered for a variety of chronic and acute conditions and illnesses. Many of the same conditions are often treated with different meds.

Medications used to treat similar conditions are usually classified as belonging to a specific group. These groups are also called classifications or categories.

Medications can be grouped in different ways, such as body organ system or biological system affected (cardiovascular drugs, eye meds, digestive meds, and so on). They can also be categorized according to chemical properties, therapeutic effects, route of administration and other ways.

Keeping it simple, we use a basic system in this inservice in which drugs are classed according to the therapeutic effects we want to achieve with the drugs. For example, *analgesics* help relieve pain, *antihypertensives* help control blood pressure, and *bronchodilators* help the person to breathe better.

The medication groups that follow briefly explain what they are given for, along with a few caregiving tips for certain drugs. Understand that many of the same medications fall in different categories, as they can serve more than one purpose. For example, aspirin is an *analgesic* (pain reliever), *antipyretic* (fever reducer), and *anti-inflammatory* (reduces inflammation or swelling), and *anticoagulant* (prevents blood from clotting).

An important point to note: if the medication is given as a PRN, note its effectiveness on the back of the MAR.

Analgesics

These are drugs that help relieve pain. There are two major types of analgesics—non-narcotic and narcotic. Non-narcotics are usually good for mild to moderate pain. Narcotic analgesics are often ordered for moderate to severe pain, or when non-narcotics are not effective enough.

Non-narcotic analgesics include the NSAIDs, drugs that have anti-inflammatory properties as well as the ability to help with pain. This includes aspirin (is also anti-inflammatory) and Tylenol.

Narcotic analgesics are derivatives of opium and, therefore, habit forming.

Antacids

Antacids neutralize stomach acid and help relieve feelings of indigestion. Antacids can have different effects on the body depending on the main ingredient. Antacids can contain aluminum, sodium, magnesium, or calcium. Antacids containing sodium should be used cautiously in residents prone to high blood pressure.

Antianxiety

Antianxiety drugs generally relax muscles and help relieve anxiety.

Antiarrhythmics

This classification of drug helps suppress irregular heartbeat, promoting a normal, regular rhythm. Antiarrhythmics have the potential side effect of bradycardia, or suppressing the heart beat too much.

Caregiving tips:

1. Digoxin (Lanoxin) is a commonly given medication. Whether or not it is actually ordered, you should take the resident's pulse before giving this drug.
2. A pulse rate less than 60 should be reported to MD before giving Digoxin.
3. Count the pulse for a full minute if the pulse is irregular rhythm.

Antibacterials

These medications help heal infections that are caused by bacteria or fungi.

Caregiving tip:

1. Antibacterials taken internally have a high rate of allergic reaction response. Be alert to any changes in the resident's condition after starting a new drug and report as needed.

Antibiotics

Antibiotics are used to treat infections caused by bacteria. They are *not* effective against viruses, which is why they don't cure the common cold. Some antibiotics are pathogen-specific—that is, they are used to target specific bacteria. This is the reason why a C&S (*culture and sensitivity*) test is often done on a body fluid, such as a urine specimen. The sample is cultured (pathogen stimulated to grow), and then exposed to numerous antibiotics in order to determine which antibiotics seem to have at least some success against the bacteria.

Some antibiotics are effective against a variety of germs. These are called broad-spectrum antibiotics. A physician often orders a broad-spectrum antibiotic when the specific pathogen

is suspected or when it is imperative that treatment begins right away. There are numerous subcategories of antibiotics—the Aminoglycosides, Cephalosporins, Penicillins, Macrolides, Sulfonamides, Quinolones, Tetracyclines, and others.

Anticoagulants & Thrombolytics

These two drug types are very much related. Anticoagulants prevent the blood from coagulating, or clotting. Coumadin is a very commonly used drug belonging to this group. Thrombolytics are "clot busters" and are used to dissolve clots that have already formed.

It is extremely important that Coumadin be given exactly as ordered. PT (protime) and INR are ordered at regular intervals to keep check on how "thin" the resident's blood is. Actually, Coumadin doesn't really thin the blood—it makes blood less able to clot, so bleeding is a concern. There is a very narrow therapeutic window for Coumadin, so it's easy to give too much or too little. Again, follow all medication orders carefully and precisely.

Caregiving tips:

1. Since bleeding is a great concern with anticoagulant therapy, be alert to any signs of bleeding.
2. Nose bleeds are the most common external site of bleeding from anticoagulant overdose, while sudden increase in bruising can be a sign of internal bleeding.

Anticonvulsants

Anticonvulsants are used to help prevent or control seizures. They depress nerve activity in the brain, thus lessening the likelihood for seizures.

Caregiving tips:

1. In assisted living communities, anticonvulsants are increasingly used to treat behavioral disturbances, since they seem to act as mood stabilizers.

2. More anticonvulsants are being used more in dementia units and in facilities that cater to mental illness residents.***Antidepressants***

Antidepressant meds help to relieve depression. They also tend to promote sleep, help relieve anxiety, and serve as muscle relaxants, depending on the specific medication. In addition to depression, antidepressants can be prescribed for other behaviors, like obsessive/compulsive behavior, anxiety, eating disorders, chronic pain, panic disorder, cigarette addiction, and even childhood bedwetting, to name a few.

Caregiving tip:

Most antidepressants don't begin to work for 2 to 6 weeks due to delayed onset.

Antidiarrheals

As the same suggests, this class of drugs promotes normal bowel elimination by reducing or eliminating diarrhea. There are two major types—those that reduce bowel muscle contraction (peristalsis) so more water can be reabsorbed, and those that have absorption properties. Kaopectate, Pepto-Bismol, and Imodium are the most common meds given for diarrhea.

Antiemetics

Emetics cause vomiting. This is why the small curvy trays often seen in hospitals and nursing homes are called "emesis" basins. Antiemetics, then, are used to help prevent or treat nausea and vomiting.

Antifungals

These are used to treat fungal infections. Fungi most often affects the integumentary system (nails, skin, hair), and mucous membranes, so many antifungals are applied topically.

Caregiving tip:

1. Many antifungal meds end in "azole," such as Miconazole or Clotrimazole.

Antihistamines

Histamine is a substance produced by cells, which causes mucous membranes to swell and blood vessels to dilate. You recognize some of the symptoms histamine causes in the runny nose, sneezing, and congestion of the nasal passages. Antihistamines help to prevent/treat an allergy by interfering with the effects of histamine. Technically, they help by preventing histamine from binding to histamine H1 receptors.

Antihypertensives

Antihypertensive medications help reduce and control blood pressure. There are several major classes of blood pressure drugs, such as ACE inhibitors, beta blockers, calcium channel blockers, diuretics, centrally acting antihypertensives, etc. Even though the different types work in different ways, they all have the ability to decrease the blood pressure.

Diuretics

These medications help reduce blood pressure by decreasing the amount of fluid in the body, pulling it out of the circulatory system.

ACE Inhibitors

Angiotensin converting enzyme (ACE) inhibitor drugs work by blocking the conversion of angiotensin I to angiotensin II. Since angiotensin II is a powerful vasoconstrictor (makes blood vessels more narrow), ACE inhibitors help relax the blood vessels, lowering blood pressure. A dry, frequent, chronic cough is a common problem in using this drug that will usually result in it

being discontinued. Drugs that end in “pril” are usually ACE inhibitors.

Calcium Channel Blockers

Calcium is an important mineral for heart muscle and blood vessel function. Drugs in this class help lower blood pressure by blocking calcium pathways. Drugs that end in “dipine” are usually calcium channel blockers.

Angiotensin II Receptor Antagonists

Meds in this class help to reduce blood pressure by blocking the vasoconstricting effects of angiotensin II. An interesting recent finding is that patients taking this blood pressure drug are 35%-40% less likely to develop Alzheimer's disease. Drugs that end in “sartan” are usually angiotensin II receptor antagonists.

Alpha Blockers

Alpha blockers work by relaxing certain muscles in the body and keeping vessels open to allow for improved blood flow. Drugs that end in “zosin” are usually alpha blockers.

Beta Blockers

Beta blockers help reduce blood pressure by blocking the effects of epinephrine, also called adrenalin. Since epinephrine causes vasoconstriction (tightening of the vessels), beta blockers help vessels to relax, improving blood flow. Drugs that end in “olol” are usually beta blockers.

Centrally Acting

The central nervous system consists of the brain and spinal cord. Centrally acting blood pressure medications work by influencing a part of the brain that controls some portion of the blood pressure system. Meds in this class are usually not the first tier to be used.

Combinations

Many conditions can complicate a patient’s response to a blood pressure drug. In many cases, optimum control can be obtained only in using several different BP meds from different classes. Working in different ways, the cumulative effect of the combination is to lower the BP to a decent level, while taking into consideration the patient’s allergies, comorbidities, and side effect potential.

Anti-inflammatory

Anti-inflammatory agents are drugs used to treat inflammation. The two major types include steroids (such as cortisone injections) and NSAIDs (non-steroid anti-inflammatory drugs).

The inflammation might have been caused by an infection, so the anti-inflammatory can reduce the swelling, pain, redness, increased blood flow and heat around the infection. Non-infected

inflammation, such as caused by arthritis or gout, can also benefit from anti-inflammatories.

NSAIDs

NSAIDS are very commonly given in assisted living communities. Aspirin, Tylenol and Ibuprofen are perhaps the most common. Drugs that end in “profen” or “fenac” are usually NSAIDS.

Antineoplastic

A *neoplasm* is a cancer. Antineoplastics, then, are used to treat cancers. Occasionally, antineoplastics are given to assisted living residents, usually in oral form. So, although most drugs in this class are given to patients in the hospital, nursing home, or home care setting, more residents with active cancers are being treated in long term care facilities. Drugs that end in “mustine” are one type of cancer drug.

Antipsychotics

There are three areas of mental health disabilities:

1. Severe and persistent (including schizophrenia, bipolar, and major depression)
2. Developmental disabilities (Down’s syndrome, cerebral palsy, etc.)
3. Substance abuse (Alcohol, tobacco, recreational or prescription drugs, etc.)

Antipsychotics, also called major tranquilizers, are used to treat major psychiatric disorders, especially persons belonging to the first group.

Special Nursing Considerations

Tardive dyskinesia is a syndrome caused by long-term use of a class of medications called neuroleptics. Neuroleptics usually fall under the category of antipsychotics, which includes the meds listed above, but also includes some meds for gastrointestinal and neurological disorders.

You can see tardive dyskinesia by the movements a person makes. Repetitive, involuntary, random, purposeless movements, like lip smacking, grimacing, tongue protrusion, rapid eye movement, puckering, and pursing of the lips can be seen. These signs are often mistaken for signs of the illness that the meds are given to treat, such as Alzheimer's. Tardive dyskinesia should not be confused with the unrelated tremors seen in residents with Parkinson's or other similar disorders.

Can a resident with tardive dyskinesia ever get rid of these movements? The answer is: sometimes. These side effects may stay with the resident throughout life, even if the medications are discontinued. However, with some residents, the side effects could decrease in severity or even go away completely, though it may take years to get to that point.

Antipyretics

You may be familiar with fireworks displays put on by pyrotechnicians. The prefix *pyro* refers to heat, as in *pyromaniac*, one who loves to start fires. Antipyretics are medications that reduce a person's temperature. Acetaminophen (Tylenol) is the most popular medication in this category.

Antivirals

These are drugs that specifically target viruses, and used to help prevent viral infections, such as the flu vaccine to stave off the flu. Antivirals are not antibiotics, which are used to control or kill bacteria.

Antivirals are used against the flu, genital herpes, viral hepatitis, herpes zoster, HIV/AIDS, SARS, shingles, viral meningitis, and viral pneumonia, among other illnesses.

Drugs that end in "vir" or "vudine" are antiviral medications.

Barbiturates

Barbiturates are medications that depress the central nervous system, causing drowsiness. They are used before surgery to help reduce anxiety or tension, control seizures, decrease nervousness, and are sometimes used to promote sleep (treat insomnia). Because of their sedative and habit forming nature, newer drugs are often used in their place. Phenobarbital (Luminal), Secobarbital (Seconal), and Pentobarbital (Nembutal) are but a few examples.

Bronchodilators

The bronchial tubes that carry air to the lungs can spasm under a variety of conditions. Bronchodilators help relax the muscles within the airway passages, helping the resident to breathe easier. Some of these drugs help prevent the symptoms of emphysema, asthma, chronic bronchitis, and other lung conditions, while others don't prevent, but help to control, those symptoms.

Cold Remedies

The "common cold" is an infection from any of more than 200 different viruses. Though there is no cure for the cold, there are quite a few medications, prescription and over-the-counter (OTC), that can help control some of the symptoms associated with the cold. In fact, medications for cold symptoms constitute the largest number of OTC drugs.

Antihistamines (meds that work to counter the production/effects of the body chemical histamine) and decongestants (meds that help relieve congestion) are the two most commonly used kinds of medications in the cold remedies group.

Corticosteroids

Corticosteroids are strong, prepared hormones (similar to cortisone) used to treat certain hormone deficiencies, and used as an anti-inflammatory in cases of severe allergies, arthritis, certain skin conditions, and asthma. They are also used to suppress the immune system.

Ordinarily, our bodies produce enough cortisone-like substances in the adrenal glands, situated on top of the kidneys. But in some conditions a supplement is needed to counter the effects of an illness or condition.

Cough Suppressants

Cough suppressants are supposed to do what the name implies—suppress a person's cough. But many substances, like menthol, honey, or glycerine, don't really suppress a cough as much as they can soothe the throat and make it less irritated feeling. True cough suppressants are few, such as those that break up phlegm or suppress the cough reflex, like antihistamines, or narcotic cough suppressors, like codeine.

Cytotoxics

"Cyto" refers to cell, so cytoxic drugs are meds that are toxic to the body's cells. Cytotoxic agents are used to fight cancer (used as antineoplastics) and are also used to suppress the immune system (immunosuppressants).

Decongestants

Decongestants are used to help relieve stuffy nasal passages. They work by constricting the blood vessels lining the mucous membranes, thus reducing swelling. Decongestants and antihistamines are the two most common types of drugs found in cold remedies. Medications containing decongestants include phenylephrine (Neo-Synephrine) and Pseudoephedrine (Sudafed, Actifed, etc.)

Diuretics

Diuretics are sometimes called "water pills." Their purpose is to help the body get rid of excess water. Certain problems or diseases of the heart, kidney, or liver can cause retention of fluid (edema) in different spaces in the body, especially the feet, lower legs, hands, face, and belly. Diuretics help the kidneys to excrete more sodium and water from the body, reducing the swelling. ("Where the salt goes, the water goes"). Diuretics are often used as a first response to mild high blood pressure.

There are three types of diuretics—thiazides, loop-acting, and potassium sparing. *Thiazide* diuretics actually dilate (open up) blood vessels and help the body get rid of sodium and water. *Loop-acting* diuretics work on the kidneys to increase the amount of urine. *Potassium sparing* diuretics, unlike other types, do not cause the body to lose potassium.

Diuretics are prescribed for a variety of purposes, such as:

Congestive heart failure (CHF)
Edema (swelling)
High blood pressure (hypertension)
Osteoporosis
Polycystic ovary syndrome
Diabetes
Certain kidney disorders
Female hirsutism (excessive, abnormal hair growth)

Expectorants

To spit is to "expectorate", and expectorants loosen up phlegm (mucous) so that it's easier to cough up and "spit out" the mucous that otherwise might be too thick to get out. Guaifenesin is a common ingredient in many cough syrups.

Hormones

Hormones are just chemicals that are produced by the glands of the body. Glands include such organs as the pancreas, ovaries, testes, thyroid, adrenal, thymus, the pituitary and pineal glands of the brain, and the parathyroid. Hormone extracts (natural hormones) or synthetic hormones are given to make up for what the body produces an insufficient quantity of.

There are several types of hormone, including sex hormones, antidiabetic hormones, thyroid hormones, and steroids. Sex hormones include birth control pills, estrogen, progestin (natural or synthetic progesterone), and testosterone ("male" hormone). Insulin and glucagon are hormones related to sugar metabolism and diabetes. Steroids are produced by the adrenal glands, while thyroid hormones are produced by the thyroid.

Hypoglycemics

Hypoglycemics are drugs used to keep blood glucose levels under control. In diabetes mellitus (the type of diabetes where there is insufficient insulin to meet demands) high blood sugar levels need to be lowered. Hypoglycemics lower glucose levels.

Insulin is covered in more detail in the section on *Diabetes*.

Immunosuppressants

These are drugs that suppress the immune system. Generally, they are used to treat disorders where the body's defense system attacks itself (autoimmune disorder), and to prevent the body from rejecting a transplanted organ.

Laxatives

Laxatives help relieve constipation. There are three main types of laxatives—bulk forming, lubricants, and stimulants. *Bulk forming* laxatives help the stool to retain water, thereby

relieving constipation. *Lubricants* coat the bowel lining, which can somewhat lessen some of the effects of constipation. *Stimulants* increase muscle contraction (peristalsis) in the bowel, moving the stool through the colon quicker. Since slower passage means more reabsorption of water, faster passage means the stool retains more water, thereby relieving constipation.

Muscle Relaxants

Muscle relaxants help ease muscle spasms. Antianxiety meds are often used for this purpose, since many of them have muscle-relaxing properties. Robaxin, Maolate, Skelaxin, and Soma are examples of muscle relaxants that are not antianxiety meds.

***NSAIDs** (**n**on-**s**teroidal **a**nti-**i**nflammatory **d**rugs)*

An *NSAID* is a "non-steroidal anti-inflammatory drug". This class of drugs is useful for lessening inflammation when GI (gastrointestinal) upset is a concern. For example, aspirin can further upset gastritis and ulcers, so an NSAID might be used, since they are usually associated with fewer potential side effects.

Sedatives

See *Antianxiety Drugs*

***Sex hormones** (male)*

Testosterone is the most powerful sex hormone in the male. Mainly the testes produce it. It is responsible for the manifestation of secondary sex characteristics, such as the deeper voice, body and facial hair, increased aggressiveness (compared to females), etc. It can be given as a drug to help compensate for deficiencies as might be found with hypopituitary gland function, or some disorder of the testes.

***Sex Hormones** (female)*

Estrogen and progesterone are mainly responsible for female secondary sex characteristics. They can be given as oral contraceptives and to help with menstrual or menopausal problems. Estrogens are often used to treat breast cancer, and in the male, can treat prostate cancer.

Sleeping Medications

There are two main groups in this category used to treat insomnia: benzodiazepines, and barbiturates. Benzodiazepines are more often prescribed due to three reasons: they are safer, have less side effects, and less likely to cause dependency. Sleeping meds are never meant to be used on a routine, permanent basis, but rather during severe sleeping problems or the occasional insomnia episode.

Tranquilizers

Many authorities do not refer to this category by name, as it covers a variety of sedatives. The milder tranquilizers are referred to as antianxiety drugs, while the major ones, known as neuroleptics, are usually prescribed as antipsychotics.

Vitamins

Vitamins are a group of special chemicals necessary for body functioning and processes. They are important for development, growth and maintenance. Most vitamins are derived from food sources, but in cases of malnutrition or liver disease, vitamin supplements may be required to be certain the body gets what it needs.

It is possible for a person to get too many vitamins. Most vitamins are water-soluble. This includes the well-known B vitamins as well as vitamin C. This means that the body takes what it needs from the foods you eat and discards the rest. However, vitamins A, D, E, and K are fat-soluble. The body will store excess amounts. Because the body will store what it does not need at the moment, it is possible to overdose with excessive amounts of these vitamins.

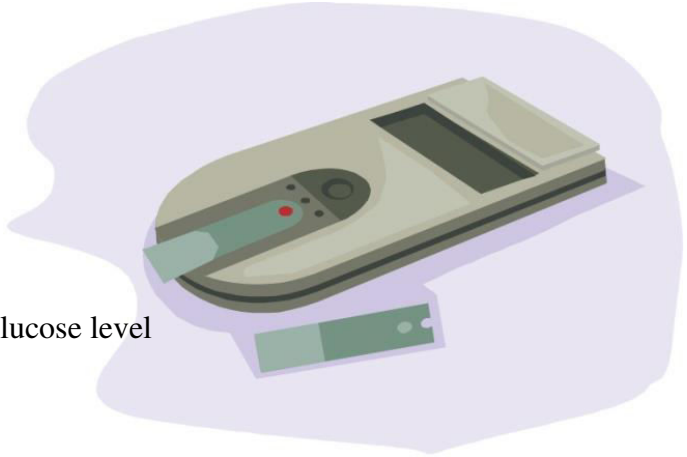
The chart below shows various vitamins and their chemical names.

Vitamin A (Beta carotene)	Vitamin B1 (Thiamin)	Vitamin B2 (Riboflavin)
Vitamin B3 (Niacin)	Vitamin B5 (Pantothenic Acid)	Vitamin B6 (Pyridoxine)
Vitamin B9 (Folic Acid)	Vitamin B12 (Cyanocobalamine)	Vitamin C (Ascorbic Acid)
Vitamin D (Cholecalciferol, “sunshine vitamin”)	Vitamin E (Alpha-tocopherol)	Vitamin H (Biotin)
Vitamin K (Phytonadione)	Vitamin P (Bioflavonoids, Phytochemicals)	

Most vitamins are given as part of another medication. For example, vitamin D is often given in Oyst Cal. Vitamin B12 is perhaps the most common vitamin given in its own right, either in oral form or as an injection. It is commonly given for pernicious anemia, alcoholism, or to those suffering from dementia.

Diabetes and insulin management

A large portion of this inservice is devoted to covering diabetes management. This is because many residents are diabetic and diabetes care covers a broad range of treatment options. Some diabetics control their blood sugars through diet alone. Others take oral medications. Some diabetics take insulin, normally given as a subcutaneous (into the fat) injection. Here is the outline of the *Diabetes and Insulin Management* portion of this inservice:



1. Introduction
2. Types of diabetes
3. Common misconceptions about diabetes
4. Risk factors for diabetes
5. Tests for diabetes
6. Hyperglycemia
7. Hypoglycemia
8. Hypoglycemia at night
9. How to perform a fingerstick to test blood glucose level
10. Insulin management
11. Sliding scale insulin
12. Insulin injection sites
13. Insulin appearance and storage
14. Mixing insulin
15. Prevention and treatment of diabetic complications
16. Diabetes and infection control

Introduction

Diabetes (diabetes mellitus) is a disease caused when the body does not produce enough insulin, or the body cannot properly use the insulin it does produce. This causes a disturbance in how carbohydrates, proteins, and fat are metabolized (burned for energy).

Insulin is a hormone produced by specialized cells within the pancreas, a finger-shaped organ about six inches long situated just behind the stomach. Insulin helps the cells in your body convert glucose (one of the simple sugars) into energy. Insulin is needed to get your cells to absorb glucose from your bloodstream. If there is not enough insulin, or if cells cannot take in glucose for some reason (insulin resistance), glucose builds up in the blood, which leads to high blood sugar.

High levels of glucose in the blood can be very hard on the blood vessels. It acts like a toxin. The imbalance and wide fluctuations in blood glucose causes blood vessels to become stiff. Plaque deposits (buildup of material on the inside of vessel walls) are more likely, leading to a narrowing of blood vessel passageways and a decrease in blood flow. This makes it harder for the tissues of many of the body organs to get the oxygen and nutrients they need. The starved organs then begin to suffer damage.

Ultimately, diabetes is a blood sugar control problem. Since the bloodstream carries blood sugars, diabetes can affect every body organ system. Strokes, heart attacks, kidney failure, digestion problems, skin breakdown, peripheral vascular disease, blindness, nerve damage, high blood pressure, and high cholesterol levels are more common in diabetics.

Some sobering statistics about diabetes:

1. Diabetes is the reason for the majority of lower limb amputations, accounting for more than 60% of such amputations not caused by trauma.
2. Diabetes is the leading cause of kidney failure.
3. Diabetes contributes to nearly a quarter million deaths in the U.S. each year.
4. The risk for stroke and for death by heart disease is 2 to 4 times higher in the diabetic.
5. 2 out of 3 diabetics have high blood pressure (equal to or greater than 140/90).
6. Diabetes is the leading cause of new cases of adult blindness.
7. 60% to 70% of diabetics have some degree of damage to the nervous system.
8. Medical costs are 2.3 times higher than in patients who don't have diabetes.
9. There are nearly 26 million Americans with diabetes, about 1 in every 12 people. Approximately 1/3 of those with diabetes don't know they have it. Another sobering statistic is that there are around 79 million people who have prediabetes. This is a condition that is not true diabetes but places the patient in a high risk category and more likely to develop the disease.
10. Diabetes is more common among minority groups, such as Latinos, blacks, Americans of Indian or Asian descent, and Pacific Islanders.
11. Roughly 285 million people in the world have diabetes. This is equivalent to 2 out of every 31 adults. By the year 2030 the number of diabetics worldwide is expected to balloon to more than 438 million!
12. Diabetics in general have about 1/3 less life expectancy, so the increase in the number of diabetes cases means an increase in complications and early death.
13. Two out of three deaths in diabetic patients are related to heart disease or stroke.

Types of Diabetes

Type 1 Diabetes

Type 1 diabetes (known in the past as *juvenile* diabetes) is diagnosed in children and young adults. The pancreas produces very little or no insulin and the person must take insulin injections. Type I diabetics can have diabetes for many years, so the chances for major complications increase dramatically. Having one or more close family members with diabetes is a major risk factor for the development of this type of diabetes. It is crucial that diabetics control their blood sugar and manage their health wisely.

Type 2 Diabetes

Around 95% of diabetics are type 2. This type is diagnosed mainly in adults, but more children are now showing signs of it. In type 2, the pancreas makes insulin, but either it doesn't make enough for the needs of the body, or the body's cells are resistant to the effects of insulin. As we mentioned earlier, people age 65 and beyond are 3 times more likely to develop diabetes than those age 35-64.

Common misconceptions about diabetes

There are many misconceptions and myths about diabetes. We've listed some of these, as you'll find below in italicized print.

Most overweight people develop diabetes

Truth: Being overweight is one of the risk factors for diabetes. However, most overweight people do not develop diabetes. Most diabetics are either of normal or near normal weight.

Fruit is healthy and you should eat lots of it

Truth: Although fruit should be included in most any balanced diet, too much fruit can negatively influence blood sugar levels. Sugar is greatly concentrated in fruit juices, which should be used in moderation.

If you eat right, you should be able to control your blood sugar without insulin

Truth: Diabetes is a progressive disease for most people. Although oral meds and proper diet can at first keep blood sugars in an acceptable range, glucose levels will creep up over time and insulin supplements become more likely.

Diabetics are more likely to get infections, colds or other illnesses

Truth: Although some kinds of infections (related to decreased circulation or sensitivity to pain) are more likely, colds and illnesses in general are no more common in diabetics. But illnesses or infections that do happen can be harder to control or get rid of.

Diabetics should not eat chocolate or sweets

Truth: Chocolates and sweets can be a part of the diet of a diabetic, especially if combined with exercise and healthy eating. They do not need to be "off limits." No study that we are familiar with shows that occasional sweets cause any more harm than if the person did not have diabetes.

Diabetics should not eat many starchy foods

Truth: Starches are an important part of a balanced diet and should be included. The key is portion size. Pasta, rice, beans, corn, cereals, whole grain breads, and similar foods can be included in the diet. Many starches also contain fiber, which can be helpful for digestion.

Diabetics should eat special diabetic food

Truth: Studies have shown that special diabetic foods or diabetic diets do not usually help control diabetes. Furthermore, calorie restricting diets without accompanying weight loss do not significantly reduce blood sugar results.

Risk factors for diabetes

The exact cause of diabetes is not known. However, we do know that there are certain hereditary and lifestyle-based *risk factors* that increase the chances of someone developing diabetes. This makes certain persons more vulnerable to developing diabetes.

Risk factors make us more susceptible to a certain illness or disease. Having one, or even all, of these risk factors does not mean a person will develop the disease. It just means that the disease is more likely. Risk factors for diabetes include the following:

Obesity

Persons who are too overweight have a higher likelihood of developing type 2 diabetes. There is scientific disagreement about the significance of certain charts, scales, or ratios that try to determine the point at which excess weight compromises health. However, this much is known to be true: if your excess weight interferes with any activity of daily living (ADL) to any significant degree, you weigh too much.

Apple-shaped figure

Some overweight folks seem to put lots of their weight around the waist or upper body (apple-shaped), while others have smaller waists but large hips (pear-shaped). Those who put on most of their weight in the upper body have a greater chance of developing diabetes and heart disease. A man's waist should be less than 40 inches, while a woman's waist should be less than 38 inches.

Age

Advancing age always increases the risk of developing the risk of diabetes. Although the elderly are most likely to have diabetes, more children are developing the disease due to a variety of factors. Still, those aged 65+ are 3 times more likely than those 35-64 to develop diabetes.

Sedentary lifestyle

Inactivity is bad for a lot of reasons, diabetes being only one of many. Not only can increased activity and exercise improve mood and comfort, it is one of the most important controllable risk factors because it helps most of the others. Activity improves cholesterol and triglyceride levels, lowers blood sugar, blood pressure, and weight, and makes it easier to stop smoking.

Family History

Diabetes has a strong genetic component. Most people with diabetes have close relatives who also suffer from the disease. A first degree relative (father, mother, brother or sister) with type I diabetes is far more likely to have the disease. Women who have had gestational diabetes are considerably more likely to get it later in life. In fact, around 40% of such women will go on to develop diabetes usually within 5-10 years after giving birth. A baby that weighs more than 9 pounds at birth increases the risk, not just for the woman, but also for the infant, later in life.

Impaired glucose tolerance

A person doesn't go from being perfectly healthy to a full-blown diabetic overnight. There are often warning signs, some hidden, some more apparent. An impaired glucose tolerance (or high fasting glucose level) is one of them. A person can initially have glucose metabolism problems and not yet develop the signs and symptoms of the diabetes disease. 1 of every 10 persons with impaired glucose tolerance will have diabetes within 5 years.

Ethnicity

Being black, Hispanic, Latino, Asian, American Indian, a Pacific Islander, or aboriginal increases the chances of developing diabetes from 2 to 6 times.

Hypertension

About 60% of those who have diabetes but are yet undiagnosed have high blood pressure.

Hypercholesterolemia

More than 40% of diabetics have high blood cholesterol or high triglycerides levels. These higher amounts of blood lipids (fats) lead to increased risk of heart disease.

Depression

Those who are depressed are considerably more likely to develop diabetes. Although we've known for some time that stress itself can cause blood sugar levels to rise, the mechanism behind why depression causes hyperglycemia is not fully understood.

Insulin resistance

Cells become resistant to insulin. This means that cells don't allow insulin to transport glucose into the cells to burn as fuel. So, the pancreas has to work harder to make more insulin. This creates a complex series of effects that can lead to the development of type 2 diabetes.

Polycystic ovary syndrome

Women with polycystic ovary syndrome (PCOS) have a higher chance of developing diabetes.

Illness or infection

Some infections can cause damage to the pancreas and contribute to the onset of diabetes.

Pancreatic diseases

Some illnesses or injuries to the pancreas can damage its ability to manufacture insulin and lead to diabetes.

Tests for diabetes

Fingerstick Blood Sugar

There are several common tests to help determine whether a person has diabetes, and to monitor the disease if it is diagnosed. A simple fingerstick blood glucose test, done with any of the glucometers on the market today, should yield a result somewhere below 100. The normal range for blood sugar is around 74-106. This is assuming an early morning test with nothing to eat or drink for at least 8 hours prior to the test (fasting glucose test).

If the result is between 100 and 125, a diagnosis of prediabetes is likely. This means that although the person does not yet have diabetes, it is more likely later on.

If the result is greater than 125 for at least 2 consecutive mornings, the person might have diabetes. However, different glucometers vary in their "normal" value ranges. This is why a plasma (having your blood drawn instead of a simple fingerstick sample) blood glucose test is preferred to confirm or rule out diabetes. It is cheap and simple to have done.

Often, it is important to check a person's blood sugar level during the day, to see how she responds to the food she eats. If any random fingerstick blood sugar test shows a result of 200 or greater, and the person has at least one of these symptoms:

1. Increased urination,
2. Increased thirst, or
3. Unexplained weight loss…

…the person probably has diabetes.

Hemoglobin A1c

The hemoglobin A1c (HgA1c, or just A1c) is a periodic blood test frequently done on diabetics. It is usually done 2 to 4 times a year. A certain amount of glucose binds to the hemoglobin (the oxygen carrying stuff) in red blood cells. The higher the glucose levels in the blood, the more that will bind to the red blood cells.

Whereas a fingerstick blood sugar tests for the amount of blood glucose at that precise moment, the A1c measures an *average* blood sugar over the last 2-4 months. Because A1c tests give an average blood glucose level (not a "snapshot" view), it is a better indicator of a person's overall diabetic status than the standard fingerstick test.

There are different formulas used to calculate the average blood glucose level with a known a1c level. One formula commonly used today is: (a1c x 28.7 - 46.7).

Remember that the A1c is only an average. It does not tell you whether the resident is controlled at that level or whether she has wild, daily swings (brittle diabetic). The a1c is used only as an indicator and much debate and research continues regarding optimal, high and low ranges, as well as relevance to specific diabetics.

Hyperglycemia

Hyperglycemia means "high blood sugar". Many residents will tell you they have "high blood". Do not assume that the resident is referring to blood sugar, since "high blood" could mean high blood *pressure*, high blood *cholesterol*, or even high blood *iron*. Some of the symptoms of high blood sugar include:

1. Polyphagia, polydipsia, polyuria
2. Fatigue
3. Weight loss
4. Blurred vision
5. Dry or itchy skin
6. Dry mouth
7. Poor wound healing
8. Recurrent or chronic infections

Polyphagia means excessive hunger. *Polydipsia* means excessive thirst. *Polyuria* means excessive urination. These are the classic signs of unrelieved hyperglycemia.

What to do…

As with any test or condition, there are degrees of hyperglycemia. If the blood sugar level is just above normal, the person will likely not show or feel any symptoms. The higher the blood sugar is, the more likely that symptoms will be present. And, treatment is more likely necessary.

In a high blood sugar condition, the goal is to bring the glucose level down. In the diabetic, this is usually done by either oral medication or insulin injection. The responsibility of the med tech is to understand signs and symptoms of high blood sugar and make sure to follow all orders and use proper technique when giving medications.

Medications can help bring down a current episode of high blood sugar. But it is important to gain long-term control. Teaching is a very important but often overlooked weapon in the arsenal of diabetes management. Make sure the resident understands what to look for when the blood sugar gets too high. Encourage the resident to be compliant with the prescribed diet, medications, and any other treatment program.

Hypoglycemia

Hypoglycemia means "low blood sugar". As noted above, don't assume that a person means "low blood sugar" when she says, "I've got low blood." She could be talking about low blood
pressure, low blood iron, or even low blood cholesterol. Diagnosis is by simple fingerstick test.

If the blood sugar is below 65, you might see some of these symptoms:

1. Sweating (very common)
2. Weakness
3. Shaking
4. Nervousness
5. Hunger
6. Nausea
7. Dizziness
8. Feeling anxious
9. Headache
10. Blurred vision

If the blood sugar is below 40, you might see some of these symptoms:

1. Difficulty concentrating
2. Confusion
3. Speaking difficulty
4. Gait or walking difficulty
5. Muscle twitching
6. Personality changes

If the blood sugar is below 20, you might see some of these life-threatening problems:

1. Seizures
2. Coma
3. Stroke
4. Death

Listen to complaints from the resident. Many long-term diabetics are acutely aware of the symptoms they tend to feel when their blood sugar drops to the point that they become symptomatic.

Remember that symptoms tend to become more pronounced as blood sugar levels fall further below normal. However, many diabetics feel very few symptoms until their blood sugar drops to dangerously low levels, since they have built up a tolerance to the symptoms. Don't rely on symptoms alone to dictate care. Understand and assess for the signs and symptoms of high and low blood sugar episodes and you will be better able to intervene with the proper care.

What to do…

As with any test or condition, there are degrees of hypoglycemia. If the blood sugar level is only a little below normal, the person might not show or feel any symptoms. The lower the blood sugar is, the more likely that symptoms will be present. And, treatment is more likely necessary.

In a low blood sugar condition, the goal is to bring the glucose level back up. Insulin is NOT given when the blood sugar is too low, because insulin makes blood sugar lower. Giving insulin to a person with a low blood sugar reading will plunge the glucose level even lower and cause severe symptoms.

The responsibility of the med tech is to understand signs and symptoms of low blood sugar and make sure to follow all orders and use proper technique when giving medications. Meds might include some form of glucose gel or tablet. Orange juice and/or sugar are often given for moderately low glucose levels. You must know and follow your facility's policy and procedure when dealing with a resident who has hypoglycemia.

Follow any doctor's orders for treating an episode of low blood sugar. Use the exact amounts of juice or sugar prescribed, if ordered. But under NO circumstance should you ever give anything by mouth if the resident is unconscious, or if their mental state is so impaired that their ability to swallow is affected. You must call for emergency help when a very low blood sugar reading occurs along with altered mental status. ALWAYS call the EMS if the resident is unconscious.

Food and medications can help bring up a current episode of hypoglycemia. But it's important to gain long-term control, especially if the resident tends to be prone to this condition. Teaching is a very important. Encourage the resident to be compliant with the prescribed diet, medications, and any other treatment program.

Make sure the resident understands what to look for when the blood sugar gets too low. People who have been diabetic for some time and have had episodes of low blood sugar quickly learn what their symptoms are. Performing a PRN fingerstick blood sugar check is a good idea for any resident who complains of having symptoms that are consistent with hypoglycemia.

Hypoglycemia at night

Diabetic residents can have low blood sugar at any time, including at night. In fact, if an early morning, fasting glucose test on a certain resident measures below 70, you can bet that the resident probably had low blood sugar for a while before you performed the test.

If a resident has low blood sugars at night, you might notice some signs and symptoms associated with it. Get a PRN fingerstick blood sugar (assuming you have orders for it) if your diabetic resident shows any of the following:

1. Restlessness
2. Waking up with a headache
3. Trying to get out of bed
4. Falling or rolling out of bed
5. Nighttime Sweating
6. Nightmares

How to perform a fingerstick to test blood glucose level

To do a fingerstick, you'll need to get together the proper supplies. Exactly what you use depends in part on the policy and procedure of your facility. Basically, you will need:

1. Gloves (always maintain infection control)
2. Glucometer (machine that actually tests the blood)
3. Test strip
4. Alcohol and cotton balls (or alcohol wipes)
5. Lancet (the needle that does the stick)
6. Lancet holder (unless using a disposable, single-use needle)

To perform a fingerstick, keep these important points in mind:

1. You must first be trained and checked off by a registered nurse.
2. Make sure you are about to test the right resident at the right time.
3. Explain to the resident what you are about to do and tell her how she can help.

Now, follow these steps:

1. Put on your gloves.
2. Select the finger (never the thumb) you want to use (be sure to rotate sites as much as possible). The best fingers to use are the two middle fingers.
3. Let the arm and hand hang in a dependent position (below the heart) for a few moments, as this improves blood circulation to the fingers.
4. Turn on the glucometer and prepare it for use.
5. Prep the finger by wiping the site with alcohol and allow it to dry completely.
6. Stick the finger using the appropriate lancet.
7. Place a sample of the blood on the correct spot on the test strip.
8. After a specified countdown time, the result will be displayed (be sure to note and record the result).
9. Clean the puncture site with a new alcohol wipe.
10. Be sure to dispose of contaminated supplies (lancet, used test strip, open/used alcohol wipes, etc.) according to policy.

Notes worth remembering:

1. Don't forget infection control measures! This includes washing your hands and wearing gloves.
2. Never stick the thumb to obtain a blood sample, due to arterial pulse.
3. Only stick the sides of the finger toward the tip—never stick the end of the finger. Nerve endings in the fingertips make it very painful and more prone to soreness.
4. The best place to stick is halfway between the side of the nail bed and the very front.
5. Do not stick the front, or fingertip *pad*, as scar tissue can develop and interfere with the sensation of touch.
6. Once the skin is punctured, do not squeeze the finger too much in an effort to *milk* out the blood, as contamination by excessive cellular or tissue fluid can cause inaccurate readings.
7. Take your time, as proper preparation helps assure you don't have to repeat the test. It also assures that you will get an accurate result.

Insulin Management

Remember from our earlier discussion that insulin is a hormone. If the body cannot make a sufficient amount of it, injections must be given to help cells take in the glucose sugar to burn as fuel. This hormone is available as a commercial preparation for those who need it.

There are several classifications of insulin, each of which you should understand in order to fully appreciate your role as a caregiver. Different types of insulin include:

1. Rapid acting (given at meal time and covers meal-related blood sugar increases)
2. Short acting (covers meals eaten within an hour)
3. Intermediate acting (covers insulin needs for roughly half the day and overnight)
4. Long acting (covers insulin needs for about a full day)
5. Premixed (usually taken two times a day, covers meals for short term needs and throughout the day)

Since there are different insulins for different needs, the doctor will order one or more types to help control the blood sugar. There are many factors that a physician must consider when deciding on what kind of insulin to order, and how much to order. Some of the questions a doctor will think about are:

1. How difficult has it been to control the diabetes?
2. Will the resident be compliant with the injections?
3. Is the resident a brittle diabetic (wild swings, hard to control)?
4. At what time(s) of the day or night does the resident have the most abnormal readings?
5. Is the resident compliant with other aspects of diabetes management, such as diet?

6. Does the resident need glucose control only around mealtime?
7. How frequently is the resident willing to get finger sticks for blood sugar testing?
8. What blood sugar management goals does the physician have in mind?
9. What is the resident's age?
10. Is sliding scale insulin used?

The chart that follows on the next page shows different classes, or types, of insulin. The chart also shows:

1. Onset (how long it takes after injection to begin working)
2. Peak (number of hours after injection when the insulin's effect is the strongest)
3. Duration (how long the insulin works from time of injection)

Note: Premixed insulins are a combination of intermediate and fast insulins. Humulin 70/30, for example, is 70% Humulin N and 30% Humulin R. The first, bigger number in the percentage always refers to intermediate insulin, while the smaller number refers to faster acting insulin.

Feel free to print this handy chart as a quick reference.

Type of insulin and brand name	Onset	Peak	Duration
Rapid acting			
Humalog	15 – 30 min.	30 min. – 1½ hours	3 – 5 hours
Novolog	10 – 20 min.	40 – 50 minutes	3 – 5 hours
Short acting (regular)			
Humulin R	30 min. – 1 hour	2 – 5 hours	5 – 8 hours
Novolin R	30 min. – 1 hour	2 – 5 hours	5 – 8 hours
Velosulin BR	30 min. – 1 hour	2 – 3 hours	2 – 3 hours
Intermediate acting			
NPH (N)	1 – 2 hours	4 – 12 hours	18 – 24 hours
Lente (L)	1 – 2½ hours	3 – 10 hours	18 – 24 hours
Long acting			
Ultralente (U)	30 min – 3 hours	10 – 20 hours	20 – 36 hours
Lantus	1 – 1½ hours	Steady, no peak time	20 – 24 hours
Levemir or Detemir	1 – 2 hours	6 – 8 hours	Up to 24 hours
Premixed			
Humulin 70/30	30 min	2 – 4 hours	14 – 24 hours
Novolin 70/30	30 min.	2 – 12 hours	Up to 24 hours
Novolog 70/30	10 – 20 min.	1 – 4 hours	Up to 24 hours
Humulin 50/50	30 min.	2 – 5 hours	18 – 24 hours
Humalog 75/25	15 min.	30 min. – 2½ hrs	16 – 20 hrs

Sliding scale insulin

Sliding scale is a unique type of insulin injection schedule. Sliding scale insulin is always done in conjunction with a fingerstick blood sugar. It is not given on a routine schedule per se, but rather the amount of insulin you give is based on what the fingerstick blood sugar result is.

The doctor decides what the exact sliding scale should be. There is a lower limit for a blood sugar below which no insulin would be given, say, below 150, 175, or perhaps 200. Then, for every range beyond that, a certain amount of insulin would be given, depending on the blood sugar. The insulin type that would be used is always rapid or short acting insulin. Consider the following sliding scale example and assume BID (twice a day) blood sugar tests:

"Sliding scale regular insulin: If FSBS < 150, 0 units 151-200 give 2 units 201-250 give 4 units 251-300 give 6 units 301-350 give 8 units 351-400 give 10 units, greater than 400 give 12 units and call MD"

So, if you did a blood sugar check in the morning and got a result of 133, you would give no sliding scale insulin. If the result was 214, you would give 4 units. If the result was 349, you'd give 8 units. Since in this example she gets an FSBS done twice a day, it is possible she would have sliding scale insulin twice a day if she always ran high. Some residents, however, are almost never high and might not ever need sliding scale coverage.

Of course, the resident might receive some sort of routine insulin in addition to their sliding scale. Some diabetic residents are on several types of insulin, so be very careful to administer all ordered insulin as scheduled.

A word of caution about sliding scale insulin: many medication errors are made when giving various amounts of insulin. The chances for errors increase when there are two sliding scales ordered, one for the daytime and one for the bedtime blood sugar check. The likelihood for errors greatly increases when the resident is on multiple routine and multiple sliding scales.

One final word: sliding scale insulin has not been shown to be any more effective than routine insulin for the majority of insulin dependent diabetics. It is usually considered to be a short term treatment, though many long-term care residents are on sliding scale coverage for years.

Insulin Injection Sites

Human skin has 3 layers—*epidermis* (the outer, thin layer), *dermis* (thicker, middle layer that contains nerve cells, blood vessels, oil and sweat glands), and *subcutaneous* (or "sq" for short, also called adipose tissue, or fat) layers. Insulin is injected into the third (subcutaneous) layer.

It is important to know where to give insulin injections, as not all sites absorb equally well. Keep these helpful points in mind:

1. Insulin can be given in virtually any part of the body where it can be given into the fat. Here's the test: can you pinch at least ½ - 1 inch of skin? The best places are the ones with a good deposit of fat and are easily accessible. These include the abdomen (stomach), back of the upper arms, and the front and outsides of the middle thighs.
2. The same insulin is absorbed at different rates depending on where the injection is given. In most cases, insulin moves into the blood stream quicker if given in the abdomen, and a little slower if given in the upper arms or thighs.
3. Activity can affect absorption rates. To help drive down elevated blood sugars and speed up how fast insulin makes it into the blood stream, have the resident to increase activity as tolerated.
4. *Different spots for different shots!* Remember this saying. Notice that it does not say different *sites* for different shots. Contrary to popular belief, you *can* use the same general site for several injections. For example, you can use the same site, such as the back upper left arm, for, say, a week's worth of daily injections. The key is to avoid successive shots very close to the exact same spot.
5. Giving injections in the same general area can actually help stabilize blood sugars, since any similar area will have similar absorption rates.
6. Remember not to give injections too closely to the exact same spot. Giving lots of shots in nearly the same spot can, over time, cause several medical problems. A condition called *lipodystrophy* can occur. This happens when the fat under the skin is altered. The fat either thickens or disappears, otherwise known as "lumps or slumps".

Insulin appearance and storage

It is important to store insulin according to manufacturer's directions. The guide points below will give you a solid base to work from.

1. Clear insulin is insulin without additives. They work the fastest. The rapid acting and the short acting insulins are examples of the clear insulins.
2. It is additives that give cloudy insulin their cloudy appearance. The additives slow the rate of absorption.
3. Cloudy insulin should be a uniform cloudy appearance once the vile is gently mixed.
4. Discard any cloudy insulin that should be clear and any clear insulin that should be cloudy.

5. Never mix Lantus insulin with any other insulin.
6. Store insulin in the appropriate place. If vial was kept in the refrigerator, roll it in your hands 10 times or so in order to warm it before withdrawing for administration.
7. Insulin is composed of a protein dissolved in water. It will spoil after a period of time. Discard any insulin past the expiration date.
8. Never freeze insulin, as it will not work as well after thawing. Throw away any insulin that has been frozen and thawed. No exceptions.
9. Warm cloudy insulin by rolling it between your hands for a few seconds. This will also mix the insulin with the additive.

Mixing insulin

It is important to mix insulin according to manufacturer's directions. The guide points below will give you a solid base to work from.

1. If you must mix insulin, always draw up the clear before the cloudy, as you do not want to contaminate the clear vials with the cloudy.
2. "Clear" insulins are the rapid and the short acting ones, while the "cloudy" insulins are the long acting ones.
3. Never mix Lantus insulin with any other insulin.
4. Always inject air into insulin vials before withdrawing insulin. If you don't, repeated withdrawing of insulin without first injecting air will create a vacuum, which, after a time, will make it very difficult to draw out the insulin, because the vacuum will create a strong suction.
5. Inject air into the insulin vials equal to the amount of insulin to be withdrawn. If you are to remove 10 units, inject 10 units of air first. This will equalize pressure. Once you insert the needle, tilt the vial upside down so that the insulin goes toward the needle while the air floats to the top.

The above points serve as a good background to mixing insulin. Now, follow these steps. Let's assume that you are giving 4 units of regular insulin to be mixed with 20 units of NPH insulin.

1. Wipe the tops of both vials with a fresh alcohol pad.
2. Pull back the plunger on the insulin syringe to the 20 unit mark.
3. Insert the needle into the NPH vial and inject the 20 units of air into it.
4. Pull out the needle without drawing up any insulin and set the vial aside for now.
5. Pull back the plunger on the syringe to the 4 unit mark.
6. Insert the needle into the regular insulin vial and inject the 4 units of air into it.
7. Tilt the vial upside down to get the insulin to flow to the needle.
8. Slowly withdraw 4 units of insulin from the regular insulin vial.
9. Pull out the needle and set aside the vial.
10. Insert the needle into the NPH vial and turn upside down.
11. Pull back on the plunger to withdraw 20 units of NPH insulin into the syringe.

12. IMPORTANT: You will go from 4 units (from the regular insulin already in the syringe) to the 24 unit mark, once you get 20 units of NPH into the syringe, so you will have 24 units in the syringe altogether.

Special considerations in the elderly resident

The elderly pose several challenges when managing diabetes. This is due to such issues as normal aging changes, increasing use of multiple medications, normal declining functional and mental capabilities, social problems, decreased exercise tolerance, presence of other acute or chronic diseases, and so on. Keeping the following special notes about the diabetic elderly in mind will help improve your care managing:

1. Around half of type 2 diabetics are over the age of 60.
2. Diabetic elderly residents are more likely to be incontinent.
3. It is harder for them to feel thirsty and easier to become dehydrated.
4. Residents with diabetes show poorer functional abilities, leading to higher risk of falls, one of the leading causes of injury in long term care facilities.
5. High blood sugar can affect cognitive (mental) functioning, increasing the chances for non-compliance.
6. Diabetics tend to be more depressed.
7. Elderly diabetics are more likely to get pressure ulcers.
8. 2/3 of amputations happen to people past the age of 65 and about 2/3 of those amputations are diabetics.
9. The elderly diabetic is more likely to contract tuberculosis.
10. Diabetes contributes to eye problems: cataracts, glaucoma, retinopathy, blindness.
11. Most of the elderly with diabetes are not seriously overweight.
12. Amazingly, calorie-restricting, diabetic diets have *not* been shown to significantly improve an elderly resident's blood sugars.
13. Diabetics have a lower pain threshold; that is, they feel pain more strongly.
14. Neuropathy pain (usually in the lower extremities caused by nerve damage) is the *most common chronic complaint* of the elderly diabetic.
15. There is no "best" form of insulin for use in the elderly. Residents who need insulin are not usually well-controlled with a single, daily dose of intermediate acting insulin

Prevention and treatment of diabetic complications

We have already mentioned that diabetes affects every body organ system. This is because excessive glucose, which is carried by the blood stream, affects the circulation vessels. This in turn reduces the amount of nutrition and oxygen the organs can receive.

It cannot be overstated that diabetic residents have to be carefully monitored in order to avoid, or at least minimize, diabetic complications. Careful monitoring, reporting, and documentation of a resident's diabetic status can greatly benefit the resident. Some of these benefits include:

1. Less pain
2. Reduced cost
3. Fewer trips to the hospital
4. Overall better quality of life
5. Preventing some complications from happening
6. Earlier recognition of complications that arise
7. Earlier treatment for complications
8. Slowing down diabetes disease progression
9. Decrease in the number and severity of high or low blood sugar events
10. Decrease in infections, dehydration, and electrolyte imbalances

There are several things you can do that will make a real difference in the quality of life for those who suffer from diabetes. One of the easiest, yet most neglected, things is just listening to them. Take seriously their complaints of pain. Evaluate any new wound, their state of mind, or signs and symptoms of an infection.

Pay attention to your senses when you give personal care. Do you see, hear, smell, or feel anything out of the ordinary? Does the breath smell fruity sweet? Is the skin dry and flaky? Is there a rash or wound you haven't seen before? Is there a discolored spot on a toe or foot? Do the toenails need trimming (an often overlooked point of care in assisted living facilities)?

You know your residents in some ways perhaps better than anyone else. If you care for a resident long enough, you will have a good feel as to what their normal state of health is. Use your knowledge of their usual disposition to your advantage. Does she sleep more than usual? Is she tired more recently? Does she complain of feeling down and lacking in energy? Is she more "moody" lately? Has she become irritable or hostile? Is she diet compliant? Is she noncompliant with any part of the prescribed treatment plan?

Take advantage of your personal care skills when you care for residents who have diabetes. Below you will see several areas of personal care. Each area has several guidelines on how to prevent or treat complications of diabetes.

Foot care

1. Observe feet daily for wounds, sores, redness, need for nail care
2. Dressings or other treatment may be needed for ulcerations
3. Skilled nursing care may be needed for moderate or severe ulcerations
4. Residents generally should not trim their own toenails
5. Toenails can be trimmed only by a podiatrist (foot doctor) or a registered nurse
6. Daily foot care as needed
7. Compliance with compression stockings (TED hose) as ordered
8. Comfortable, soft shoes—nothing that will bind or restrict circulation
9. Give foot care as appropriate, including lotion, bathing, etc.

Eye care

1. Make sure residents comply with eye doctor appointments
2. Routine eye exams are necessary, as the eyes are among the first place to reveal a problem with circulation
3. Diabetes can lead to glaucoma, retinopathy (disease in the retina), and macular edema (fluid leaking from tiny blood vessels in part of the retina in the back of the eye ball)
4. Diabetes is the major cause of blindness in the U.S.
5. Controlling blood sugar and blood pressure is essential to good eye care
6. Report complaints of decreased or hazy vision
7. Report any signs of an eye infection

Oral care

1. Note any mouth sores, pain, tooth, or chewing problems
2. Oral care is one of the most neglected personal care areas—make sure oral care is done daily and assist if resident cannot do own oral care
3. Make sure resident keeps dental appointments
4. Note any new orders you are likely to see following dental/oral surgery
5. Encourage resident to wear her dentures, if applicable
6. Monitor appetite and intake
7. Observe swallowing ability

Controlling blood pressure

1. Blood pressure control is vital to lessening the destructive effects of diabetes
2. BP meds must be given faithfully as ordered
3. Routine vital signs are often neglected—be sure to take BP as ordered and document in designated places

Managing diabetic neuropathy

1. Neuropathy is nerve damage—diabetic neuropathy is nerve damage caused by diabetes
2. Roughly 60% of diabetics suffer from some form of neuropathy
3. Neuropathy often causes pain, depending on the nerves that are actually damaged
4. Routine pain meds should be given as ordered
5. PRN pain meds should be given as ordered when routine pain meds are insufficient
6. Neurontin is often the drug of choice in helping control neuropathy pain
7. Be serious about pain management and report to MD if pain is not well-controlled

Controlling lipidemia

1. Lipids are fats and too much of it interferes with glucose metabolism
2. Give lipid-lowering, cholesterol-lowering meds as ordered
3. Make sure labs are done according to ordered schedule
4. Frail, elderly residents generally should NOT have dietary fat restrictions

Managing cardiovascular disease

1. Note and report any complaints of chest pain, shortness of breath, congestion, or unstable/abnormal vital signs
2. Take vital signs as ordered and PRN
3. Make sure resident receives all meds as ordered
4. If nitroglycerin tablets are ordered, be sure to take a baseline BP before administering the first tablet (under the tongue—*sublingual*) and a BP before each additional tablet
5. Learn CPR and keep up-to-date on changes in CPR techniques

Managing nephropathy

1. *Nephro* refers to the kidney, so *nephropathy* refers to kidney disease
2. BUN and creatinine are two common tests used to help determine kidney function—high results in both these tests might mean kidney damage or disease
3. Observe color of urine as able and document
4. Residents with kidney disease generally should not eat a high protein diet
5. Controlling glucose levels and blood pressure will go far in limiting the damage to body organ systems caused by diabetes

Diabetes and infection control

Although we've covered infection control in general earlier in this inservice, diabetic management brings up new challenges. The risk of transmitting a blood-borne pathogen through the use of equipment in obtaining fingerstick blood sugar readings or in giving insulin is often underappreciated.

The blood-borne pathogens that are the greatest concern to most healthcare workers are hepatitis B virus (HBV), hepatitis C (HCV), and HIV (virus that causes AIDS). It has been estimated that there have been at least fifteen outbreaks of the hepatitis B virus over the last ten years due to noncompliance with proper med administration techniques. It is likely that the number is higher than fifteen, due to underreporting and not recognizing the nature of the outbreak. Most of the outbreaks occur in long-term care facilities.

How are blood-borne viruses transmitted from one person to another? There are several circumstances that contribute to this:

1. Not washing or sanitizing your hands
2. Using the same insulin syringe or pens among different residents
3. Not wearing gloves or not changing gloves between residents
4. Using the same fingerstick or puncture device among different residents
5. Using the same glucose meter among different residents or failing to properly disinfect the machine before using it on the next resident

Let's take a look at each of these more closely.

Wash your hands!

The first rule of infection control when you are about to perform a fingerstick or give insulin is to wash your hands. In some situations it may be acceptable to use a hand sanitizer, but there should always be some form of hand hygiene. Policy on infection control in the facility in which you work will address this.

Best practice rule: Always practice some form of hand hygiene before providing care to each and every resident.

Wear gloves!

Many med techs make the mistake of not changing gloves between residents. It is good to serve up a reminder at this point that infection control is a two way street. You don't want an infection, but you also don't want to give one to someone else. Even a microscopic amount of body fluid from a resident on your gloves, if introduced into the puncture wound you create on the next resident, could cause the illness that your gloves were designed to help prevent.

Best practice rule: Immediately after completing diabetic care, remove your gloves and sanitize or wash your hands.

Do not use the same syringe among different residents!

Insulin syringes and pens are used as the vehicle for getting the insulin into the resident. This is done by puncturing the skin with a needle. A standard insulin syringe is used to puncture a bottle of insulin, extract the exact amount of insulin needed, then administered to the resident.

An insulin pen is manufactured as a safe alternative to using multiple syringes. One pen is used for one resident, with the needle being changed before each dose. The same pen can be used for multiple shots until the cartridge or reservoir is empty.

A used syringe or needle is contaminated with the blood of the previous user. Many infections and deaths can be traced to sharing syringes.

Best practice rule: Never use injection equipment for more than one person. Insulin syringes should be discarded immediately after use in the proper sharps container. Needles used for pens must be removed and properly discarded immediately after use.

Do not use the same puncture device or needle between different residents!

There are two major types of lancet holders or needle puncture devices: single use and reusable. Single use needles are disposable. They have an auto-disabling feature that prevents you from reusing the same needle again. It should make sense that these are the safer of the two types.

Reusable needle holders, also called lancet holders, are devices that can be used multiple times. A new needle (lancet) is loaded into the device when a fingerstick is to be done. The problem with this kind of instrument is that it must be cleaned right after each use. First, the needle must be removed and properly discarded. Then, the end cap or any disposable portion must be cleaned or changed. This type of device has been implicated in the spread of blood-borne viruses due to improper care and cleaning. Because of this, reusable needle holders should never be used among different residents.

Best practice rule: Use a single use needle to perform a fingerstick for blood sugar checks. Don't use fingerstick equipment for more than one resident.

Residents should have their own blood glucose meters!

The glucometer, or blood glucose meter, is the device used to test the blood for glucose concentration. There is a very real risk of transmitting a virus from an infected resident to another when using the same machine that has not been properly disinfected. Follow the manufacturer's directions for proper maintenance and cleaning. If the manufacturer does not give directions for cleaning and disinfecting the machine, it should not be shared among residents.

Best practice rule: When possible, do not share glucometers. If more than one resident shares the same blood glucose meter, the machine must be cleaned and disinfected after each use.

Thanks for taking this inservice. Understanding and applying the principles, tips and techniques outlined here will help you administer meds in the safest and most efficient way possible.

