

# 4N051, Module 8, Pharmacology



Lesson 1- Pharmacology



Lesson 2- Local Anesthetics



Lesson 3- Blood Administration

# Lesson 1- Pharmacology

---

---

**After completing this lesson, the student will be able to identify pharmacology principles in accordance with prescribed guidance and publications.**

## Pharmacological Abbreviations

There are many abbreviations that you must know for medication administration. Abbreviations are used in medication orders to show when to take meds, how many times a day, how much to give at a certain time, and special instructions when it comes to administration. There is also a list of abbreviations, acronyms and symbols that are NOT to be used for medication documentation. This list is provided by The Joint Commission (TJC) and standardized for every hospital/clinic with its accreditation.

These abbreviations are the quick medical shorthand providing a clear and concise way to communicate through documentation. For legal reasons and to provide accurate care to patients, documentation must be legible to others. Due to the frequency of errors for medications, terminology and abbreviations, the Joint Commission (JC) established a list of abbreviations unsafe and not allowed to be used anymore. In addition, there may be a local policy in place restricting usage of some abbreviations even further. The safest action is to spell out all documentation so there is no question of the intent of the written

message. Some common approved abbreviations and the abbreviations that are not to be used anymore are listed in the outline.

This list is not all inclusive because there are abbreviations that are used in specialty areas and within medical treatment facilities (MTF). Ensure you familiarize yourself with your local policy regarding medical terminology and medication abbreviations.

Remember that legible and accurate documentation is critical to the adherence of accrediting agency standards and patient safety.

### Approved Abbreviations

Abbreviation	Meaning
ac	before meals
ad lib	as desired
BID	twice a day
c	with
°C	Celsius
gtt(s)	drop(s)
IM	intramuscular
IV	intravenous
kg	kilogram

Abbreviation	Meaning
l	liter
mg	milligram
ml	milliliter
mm	millimeter
NPO	nothing by mouth
PO	by mouth
prn	as needed
pt	patient
q	every
qh	every hour
s	without
STAT	at once
tab	tablet
Tbs	tablespoon
tsp	teaspoon
QID	Four times a day



Abbreviation	Meaning
TID	Three times a day
Q2h	Every two hours

### Multiple Choice

What does the following abbreviation mean: NPO?

---

- ☐ At once
- ☐ Nothing by mouth
- ☐ Not by pill
- ☐ Any time

SUBMIT



Complete the content above before moving on.

Watch the video below for more information about nursing abbreviations.

All videos in this lesson were acquired from [www.registerednursern.com](http://www.registerednursern.com), feel free to visit the website below for more nursing information.

#### **RN** REGISTERED NURSE RN

Nurse Salary Averages Over Time						
	2017	2018	2019	2020	2021	Change since last year
Nursing Assistant	\$28,540	\$29,580	\$30,720	\$32,050	\$33,250	3.74%
LPN / LVN	\$45,710	\$47,050	\$48,500	\$50,090	\$51,850	3.51%
RN	\$73,550	\$75,510	\$77,460	\$80,010	\$82,750	3.42%
Nurse Midwife	\$103,640	\$106,910	\$108,810	\$115,540	\$114,210	-1.15%
Nurse Practitioner	\$107,480	\$110,030	\$111,840	\$114,510	\$118,040	3.08%
Nurse Anesthetist	\$169,450	\$174,790	\$181,040	\$189,190	\$202,470	7.02%
RegisteredNurseRN.com Data Source: BLS.gov						

## Registered Nurse RN

Welcome to Registered Nurse RN. Our mission is to help aspiring nurses, nursing students, and new nurses. Aspiring nurses can learn about the different types of nurses, education requirements, and nurse salary statistics. Nursing students can access care plan examples, nursing school study tips, NCLEX review lectures and quizzes, nursing skills, and more.

[READ MORE REGISTERED NURSE RN >](#)



**Medication Abbreviations Frequencies & Orders Video  
Transcript.pdf**  
150.8 KB



---

## **Safety Factors in Administration of Medications and Fluid Therapy**

There are laws, as well as security and accountability issues, that pertain to proper medication administration. You are responsible for learning and following these laws and regulations. For the most part, federal law controls drug administration. There are **two** main laws that apply to the administration of drugs:

1

The first one is the Food, Drug, and Cosmetic Act. It was implemented by the FDA and requires (among other things) all labels to be accurate and all drugs to be tested for harmful effects before permitting release to the market.

2

The second law is the Comprehensive Drug Abuse Prevention and Control Act (also referred to as the Controlled Substances Act). It categorizes controlled substances and places limits on how often a prescription can be filled for an individual. In addition, the Air Force has specific guidelines in place to ensure that healthcare members adhere to these laws and follow proper procedure for drug administration.

---

For drug security and accountability there are four guidelines to remember:

---

1

Store narcotics under double-locked cabinets in the MTF.

2

Store all other medications in single-locked cabinets.

3

Account for all double-locked drugs at the end of each shift and properly document the action.

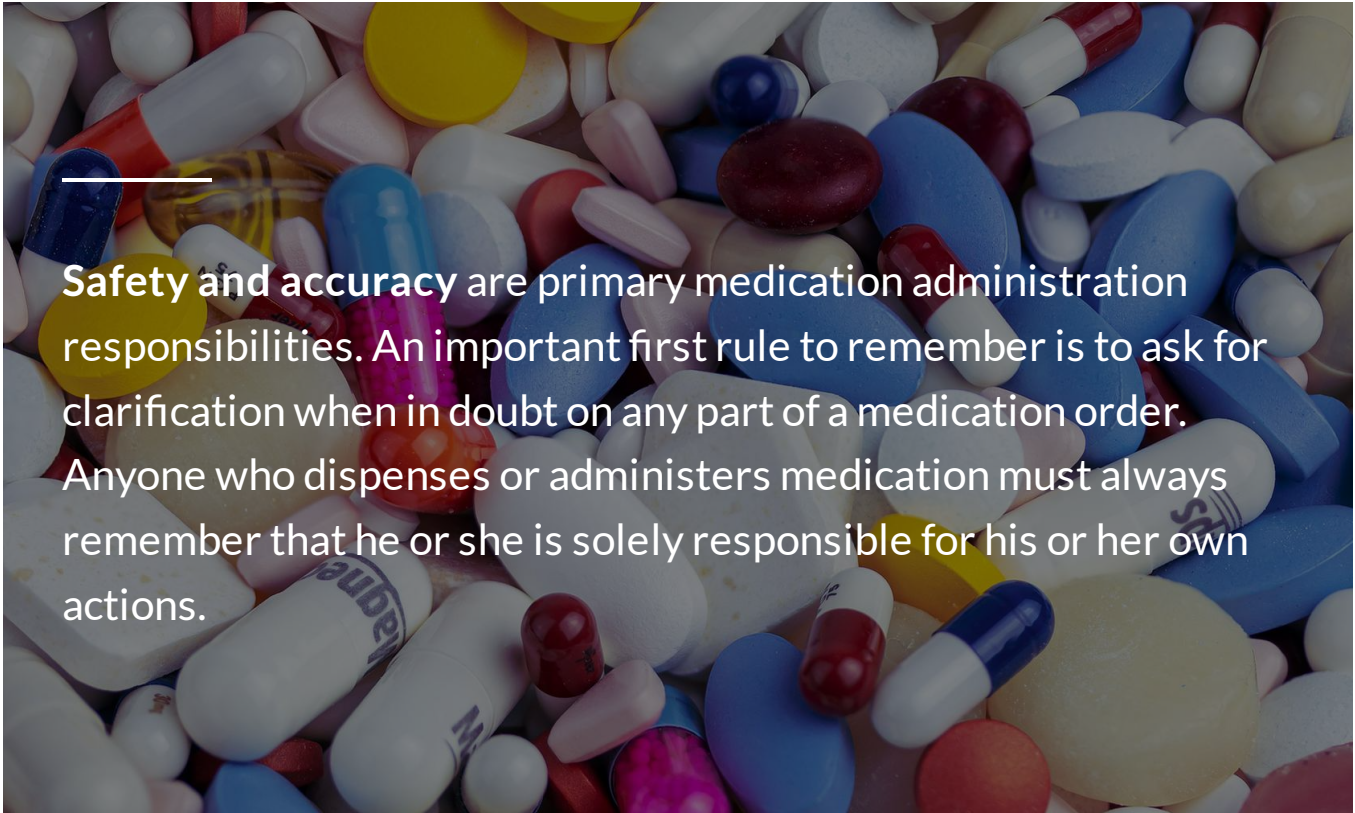
---

Allow provider-approved bedside medications for inpatients. If used, document in the patient's chart.

As mentioned previously, the Controlled Substances Act pertains to narcotics and other drugs with abuse potential. This law is enforced by the Drug Enforcement Administration (DEA) of the US Department of Justice. The US Attorney General is responsible for designating drugs as "controlled substances." These drugs are further classified into schedules according to their potential for abuse.

The following is a list of the seven essential parts that must be included with each drug order:

- 1 Patient's name
- 2 Date the order was written
- 3 Drug name
- 4 Drug dosage
- 5 Method of administering the drug
- 6 Time and frequency medication is to be given
- 7 Signature of the provider



**Safety and accuracy** are primary medication administration responsibilities. An important first rule to remember is to ask for clarification when in doubt on any part of a medication order. Anyone who dispenses or administers medication must always remember that he or she is solely responsible for his or her own actions.

---

**Before administering medication you need to review the patients history and rights. Click the tabs below to learn more about these two areas.**

---

#### PATIENT HISTORY

You must obtain an accurate history pertaining to a patient's medication background before you administer or dispense any medication. Two essential considerations you must obtain and document are the patient's current medications and allergies. You must know what medications a patient is currently taking because of the possibility of an adverse reaction that could occur when two or more medications are introduced into the body.

You must know a patient's allergies to avoid giving a drug that previously caused an adverse reaction in the patient. Some allergic reactions are mild, while others cause serious problems.

#### PATIENT RIGHTS





#### PATIENT HISTORY

#### PATIENT RIGHTS

When medications are dispensed or administered, patients or legal guardians have the following rights:

- To be informed of the drug's name, purpose, and side effects
- To refuse any medication
- To have a qualified person assess their medical history before being given any medication
- To receive clearly labeled medication containers and instructions
- Not to be given any medication unnecessarily



### Multiple Choice

How should you store narcotics at your medical center?

---

- ☐ Under double-locked cabinets in the MTF
- ☐ Under single-locked cabinets in the MTF
- ☐ By the bedside of patients and documented in the patient's



chart



At the receptionists desk at the front of the medical clinic

SUBMIT



Complete the content above before moving on.



Photo credit: DVIDS

## Principles of Administration

With all aspects of patient care there are principles that must be followed. Medication administration is a procedure that is considered high risk. With any medication administration, the intent is to produce a particular reaction in the body. The thought is that once a medication has been given to a patient, you are not able to retrieve the medication.

You may be thinking, “When medication is given by mouth, it is not absorbed immediately.” This is true, but the intention is not to induce vomiting to retrieve the medication that was given. As a medical technician, it is your responsibility to be knowledgeable, skilled, and have good judgment when administering any medication to a patient. Click the checkboxes below after reading about each area of responsibility.

☐

**Knowledgeable**—Keeping up to date with the medications you administer is important. Learn the purpose of the medications, the potential side effects, cautions, contraindications, and possible interactions with other medications.

☐

**Judgment**—The wisdom to assess the patient’s need accurately for the medication, to evaluate the response to the medication, and to plan appropriate interventions as indicated.

☐

**Skill in delivery**—Training is initiated at the apprentice level when you delivered your first subcutaneous injection to your classmate. You are now ready to progress and be capable of giving medications in a variety of routes, and know which route is suited for the medication ordered. Medication administration requires continuous training to ensure skill maintenance and is required to be documented.

☐

**Patient education**—This is an extension of being knowledgeable. You must be able to impart the information of the medication in lay terms to the patient receiving the treatment.

Most often, reading the information inserts found with the medication supply fulfills these principles. If you are unable to locate the insert, there are a number of sources to educate yourself on the medications beginning with the Physician's Desk Reference (PDR). Each military treatment facility (MTF) has a list of approved references that are available to all healthcare providers. With the responsibility of medication administration carries moral, ethical, and legal responsibilities. Most MTFs require Aerospace Medical Service technicians to take and pass their local pharmacology course or test. This ensures training is accomplished and documented before any administration.

When preparing to administer medication, basic principles should always be kept. Always wash your hands before handling medications and ensure the area you are preparing the medication in is clean. Be sure medications are rotated and never used past their expiration dates.

---

Watch the video below to learn more about the medication routes of administration and medical abbreviations nursing review.

---



**Medication Routes of Administration and Medical Abbreviations  
Video Transcript.pdf**  
161 KB



CONTINUE

The Six Rights of Medication

Watch the video below to learn more about the rights of medication administration in nursing (5, 6, 7, 9, 10, 12).



Rights of Medication Administration in Nursing Video

Transcript.pdf

198.1 KB



Right Medication



Start by verifying the order with the provider who wrote the order, not the nurse or another provider, unless the order is going to be rewritten by the new provider. Confirm the right medication by carefully comparing the name of the drug ordered with the label on the package, bottle, or unit dose packet. Never give a medication when the name on the label is not clear or obscured in any way.

If there is any question about the drug order because of handwriting, misspelling, inappropriateness, allergies, or interactions, you have the right and the responsibility to question the order. Never give medications that someone else has prepared, and never leave medications at the bedside unless specifically ordered by the provider and verified in the written order.



## Right Dose —

Administering the right amount of the drug is extremely important. This is why medication calculations were reinforced previously. Verifying the right medication and calculating the dosage using the ten basic calculation steps are vital to your patient's health.

Anyone who administers medications has the right and responsibility to question any dosage that is unusual or seems inappropriate for the individual patient. Seemingly inappropriate orders must be verified with the ordering provider.

There are seven dosage levels that are considered when an order for medications is made.

1. Minimum dose—Smallest amount of a drug that will produce a therapeutic effect.
2. Maximum dose—Largest amount of the drug that will produce a therapeutic effect without producing symptoms of toxicity.
3. Loading dose—Initial high dose used to elevate the level of the drug in the blood quickly. It is then often followed by a series of lower maintenance doses.
4. Maintenance dose—Dose required to keep the level of the drug in the blood at a steady state in order to maintain the desired effect.
5. Toxic dose—Amount of a drug that will produce harmful side effects or symptoms of poisoning.
6. Lethal dose—Dose that causes death.
7. Therapeutic dose—Dose required to produce a desired effect.



## Right Time —

The time of administration is an important part of drug dosage. Many medications are prescribed on a schedule (i.e., q4h, bid, or qd). This is to ensure the maximum effectiveness of the medication.

When medications are not given at the correct time, it will render the dosage ineffective. The dosage is defined as the amount of the drug given for a particular therapeutic or desired effect.



## Right Route —

Route of administration is important because of its effect on degree of absorption, speed of drug action, and the side effects of the drugs. Many drugs are supplied in a variety of ways, such as acetaminophen. This medication is supplied in tablet form, suppository, and liquid.

You have the right and responsibility to question the appropriateness of the route based on your assessment and observation of the patient's condition before administering the medication. A change in route may be indicated by the patient's condition change from the time the medication was initially ordered.





## Right Patient —

The patient who is to receive the medication must be identified using certain techniques to reduce the chance of error. The patient's wristband (inpatient) or identification (ID) card (outpatient) is always first. You may then ask the patient to state his or her name if he or she is coherent and conscious.

If the patient is not coherent or conscious, check the chart or ID tag on the end of the patient bed. If at any time your patient questions the medication or the dosage, recheck the order and the medication before giving it.



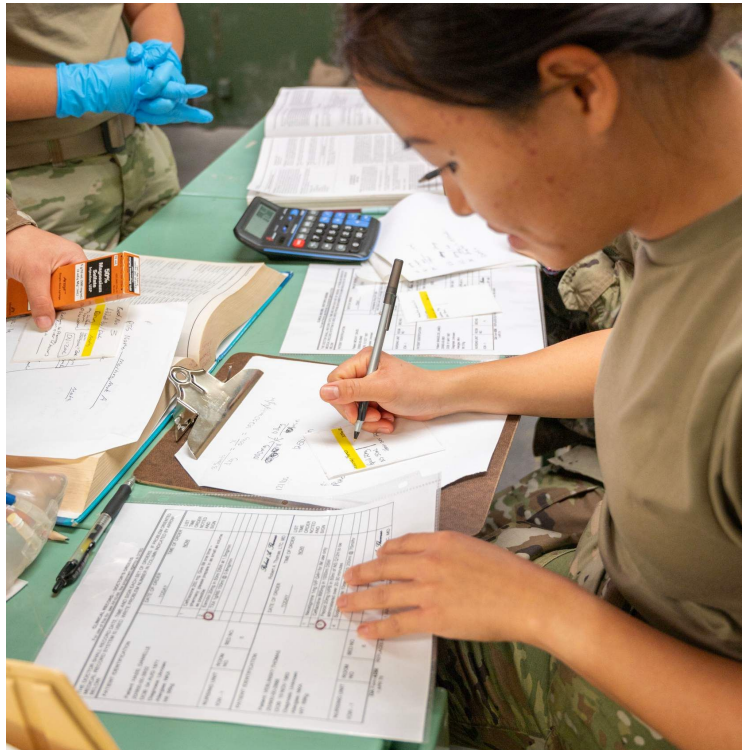
## Right Documentation —

The last essential duty to all medical care provided is documentation. Follow the rule: if it was not documented, it was not done. Every medication administration must be recorded in the patient's record. There are certain items that must be documented: the medication, dosage, time, route, the location if an injection, any adverse signs or reaction, and the patient's response to the medication administered. Any patient's record has the potential to be examined in court; the accuracy of the documentation can be the critical factor in some legal judgments. At all times make sure your documentation follows your local MTF policies and guidelines, The Joint Commission (TJC), and any other agency directing the patient care for your facility.

A patient's SAFETY must be an overriding concern throughout the entire process of preparing and administering medications. Even the most "harmless" medication can cause illness or even death if prepared or administered in an unsafe manner.

Some of the more common mistakes that occur when personnel prepare and administer medications are contamination of equipment or of the medication and medication errors.

Contamination occurs because the preparer is not using a sterile technique or because someone else is interfering with the process. Medication errors (wrong patient, wrong dose, etc.) occur because the preparer is not thinking and not following facility guidelines that ensure safety and accuracy.



### Multiple Choice

Which "right of medication" tells the nurse about the medications prescription schedule (i.e., q4h, bid, or qd). This is to ensure the maximum effectiveness of the medication.

- ☐ Route
- ☐ Time
- ☐ Patient



Documentation

SUBMIT



Complete the content above before moving on.

## Safety Guidelines

**All medical facilities have established routines and rules for providing a safe, orderly, and economical method of preparing and administering medications.**

**These guidelines provide information on the following:**

### Safeguarding The Medicine

Drug security is not the only part of the safeguarding process. Access to medication and administration equipment also must be controlled when preparing, transporting, or administering medications. Under normal circumstances, both the medication cabinets and the preparation

supplies and equipment (needles, syringes, etc.) are kept either within the nurses' station or in a locked supply room nearby.

Access to these areas is controlled. Unauthorized personnel, patients, and visitors should never be allowed access to either the medications, equipment, or supplies used to prepare medications.

## Preparing The Medicine —

The first step in preparing a medication is to verify the medication order. Once the provider orders the medication, the nurses and medical technicians then carry out the order as written and document fulfillment of the procedure in the record. If any part of the order is illegible or raises a doubt as to its accuracy, either you or the nurse should contact the prescriber for verification.

\*Technicians will not take verbal orders.

Medications should be prepared in a controlled environment. The area should be well lit and out of the line of traffic for other nursing personnel and patients. This allows the individual who is preparing the medications to work alone without distractions or interruptions. Once the medications are prepared, the preparer must remain with them. If you are the preparer and an emergency forces you to leave, you must lock the medications in the cabinet before leaving.

Use aseptic techniques when preparing a medication. Certain parts of needles and syringes must be kept sterile before, during, and after preparation of a medication. Even when putting pills in a cup, you should wash your hands before beginning in order to avoid contaminating the medication, equipment, or supplies.

When preparing a medication, check the label on the container to ensure safety and accuracy. If the label is difficult to read or has come off the container, return the medication to the pharmacy and obtain another container of the medication. Follow the same precaution if the medication appears contaminated (looks cloudy or has sediment in it).

Drug information is frequently updated in reference books that should be readily available in each clinic or unit. Two of the most commonly used references are the PDR and the Nurse's Drug Handbook. All healthcare personnel involved in medication administration duties should be familiar with references such as these. Be sure to use these references regularly, rather than relying on your memory, to stay informed of medication precautions and guidelines.

## Identifying The Patient —

Identifying the patient is an essential part of medication administration. Like some of the other precautions, the guidelines for identifying the patient may seem a little excessive, but they are intended to ensure safety and accuracy. Initially, always compare the patient's name band or ID card with the chart. Ask the patient to state his or her full name and date of birth if the patient is capable of doing so.

## Administering The Medication —

Use aseptic techniques when administering a medication. Use a sterile technique when giving an injection or starting an intravenous (IV). In all cases, follow the principles of asepsis. Remain with the patient until he or she has taken the medication. Observe the patient for any adverse reaction. If a reaction does occur, immediately notify the nurse or provider.

If a patient tells you that the medication you are about to administer made him or her feel bad the last time or if the patient states that he or she has an allergy to that medication, do not give the drug without checking with the nurse or doctor. Allergic reactions can be fatal. Also, check the medication if the patient states that it appears different. You may have made a mistake, and withholding the medication could prevent a medication error. Remember, the patient has the RIGHT to refuse any medication, so do not attempt to force it if the patient is hesitant for any reason. However, it is important to try to find out why the patient is refusing the medication, report the situation promptly to the nurse or provider, and document the situation.

Do not administer any medication you have not personally prepared. The person who administers the medication is responsible for his or her actions. A person who is responsible enough to administer a medication is responsible enough to prepare it.

## Documenting The Administration —

It is very important that you document the procedure immediately after administration. Do not delay this step. Promptly documenting the completion of a procedure significantly reduces the danger of another individual duplicating the administration. Further information on documentation is addressed in the next lesson.

## Disposing Of Unused Medication —

Except for emergency situations, patients must not be forced to take medication against their will. Under normal circumstances, when a patient refuses a medication, you should try to find out why and report the situation promptly to the nurse or provider. Then document the situation in the patient's record. Do not put unused medication back in its original container. Even if unused, it is considered contaminated. This does not apply to individually packaged tablets still in their original package.

Document the manner of disposal in the nurse's notes or other appropriate form.



## Reporting A Medication Error —

In spite of all established guidelines, healthcare personnel are human and mistakes will occur. If you make a mistake, don't try to hide it! The first thing you should do is assess the patient's condition and notify the nurse or provider. Check the patient's vital signs and observe for any unusual reactions (pallor, sweating, etc.).



Make an entry in the nurse's notes describing the situation and any remedial action taken. You also need to complete Air Force (AF) Form 765, *Medical Treatment Facility Incident Statement*. The information on the form should include a factual statement of what happened without any opinions or conclusions regarding the incident.

## Special Safety Considerations

Remember these important rules when dispensing or administering medications:

- Question any order you think might be incorrect.
- Be knowledgeable about the desired effect and potential adverse reactions associated with any medication being dispensed or administered.
- Never use a medication that has not been obtained from a container that is clearly labeled.
- Never leave medications unattended at a patient's bedside unless ordered to do so by the provider.
- If a medication is not properly administered at the appropriate time, record that fact along with the reason for the omission in the patient's record.
- Report any medication administration error immediately to the nurse or provider.
- Report adverse reactions immediately to the nurse or provider.

## Medication Reconciliation

---



As defined by **TJC**, medication reconciliation is "the process of comparing a patient's medication orders to all of the medications that the patient has been taking. This reconciliation is done to **avoid medication errors**, such as omissions, duplications, dosing errors, or drug interactions.

It should be done at **every** transition of care in which new medications are ordered or existing orders are rewritten.

Transitions in care **include changes** in setting, service, practitioner, or level of care.

The medication reconciliation process comprises **five** steps:

- 1 Develop a list of current medications.
- 2 Develop a list of medications to be prescribed.
- 3 Compare the medications on the two lists.
- 4 Make clinical decisions based on the comparison.
- 5 Communicate the new list to appropriate caregivers and to the patient.





This means that there are two parts to address medication reconciliation.

### *Medication Reconciliation*

#### **Part A**

The first part or Part A is when clinician/pharmacist reviews the medication profile with the patient to assure it is correct and up-to-date. They will then discontinue all nonactive medications and renew all expired medications. If the patient already has these medications, the pharmacist places them on hold. The clinician will also prescribe new medications not on the medication profile including over the counter (OTC), herbal, and traditional medications. All prescriptions will contain the indication for prescribing (to address health literacy).

### *Medication Reconciliation*

#### **Part B**

During the second part or Part B—Patients will receive a copy of their medication profile using the Patient Wellness Handout or other printed report. The medication profile will contain

medications with the status of active, hold, or returned to stock. Medications that are expired, not current therapy and discontinued should not appear on the profile. Consider printing a copy of the Patient Wellness Handout for the patient containing his or her medication profile. The medication profile is to be reviewed with the patient, and then you can document the medication reconciliation process using the patient education code.



When completing a medication reconciliation you should emphasize the importance of maintaining an accurate and updated medication profile. You should also provide the patient/family with a copy of the patient's medication profile and discuss the content with the patient/family.

Emphasize that the profile should consist of all medications, including prescription, OTC medications, herbals, and traditional medications. Lastly, always emphasize the need for patients to provide clinicians with a copy of their complete medication profile anytime there is a transition of care when possible.

## Medication Reconciliation Process

## The Medication Reconciliation Process



This process comprises five steps.



## Step 1

### Current Medications

The image shows a 'Medication List' form with a grid for recording medication details. The form includes fields for patient information (Name, Birth Date, Phone #, Email), allergies, and a table with columns for Medication (brand, generic name, dose), Appearance (type, shape, color), How Many?, and How Taken?. The table has rows for 'AS NEEDED', 'AFTER WAKING UP', 'AFTERNOON', 'EVENING', and 'BEFORE BED'. A silver pen, a blister pack of white tablets, and three small glass vaccine vials are placed on the form.

MEDICATION brand, generic name, dose	APPEARANCE type, shape, color	HOW MANY ?	HOW TAKEN ?
AS NEEDED equate, ibuprofen, 200mg	tablet, round, brown, "1-2"	1 tablet	by mouth, with water
AFTER WAKING UP			
AFTERNOON			
EVENING			
BEFORE BED			

Develop a list of current medications.

## Step 2

### Doctor Ordered



Develop a list of medications to be prescribed.

### Step 3

## Compare



Compare the medications on the two lists.



#### Step 4

## Decide



Make clinical decisions based on the comparison.

## Step 5

### Communicate



Communicate the new list to appropriate caregivers and to the patient. This means that there are two parts to address medication reconciliation:

Part A—Clinician/pharmacist reviews medication profile with the patient to assure it is correct and up-to-date.

1. Discontinue all nonactive medications.
2. Renew all expired medications. If the patient already has these medications, the pharmacist places them on hold.
3. Prescribe new medications not on the medication profile including OTC, herbal, and traditional medications. All prescriptions will contain the indication for prescribing (to address health literacy).

Part B— Patients will receive a copy of their medication profile using the Patient Wellness Handout or other printed report.

The medication profile will contain medications with the status of active, hold, or returned to stock.

Medications that are expired, not current therapy and discontinued should not appear on the profile.

Consider printing a copy of the Patient Wellness Handout for the patient containing his or her medication profile.

## Always Document



Document the medication reconciliation process using the patient education code. The medication profile is to be reviewed with the patient. Consider printing a copy of the Patient Wellness Handout for the patient containing his or her medication profile. Emphasize the importance of maintaining an accurate and updated medication profile.

Provide the patient/family with a copy of the patient's medication profile. Discuss the content of the medication profile with the patient/family. Emphasize that the profile should consist of all medications, including prescription, OTC medications, herbals, and traditional medications. Emphasize the need for patients to provide clinicians with a copy of their complete medication profile anytime there is a transition of care when possible.

### Multiple Choice

What is the process of comparing a patient's medication orders to all of the medications that the patient has been taking?

---

- ☐ Medication resolution
- ☐ Medication comparison
- ☐ Medication reconciliation
- ☐ Medication listing review

SUBMIT



Complete the content above before moving on.







## Authorized Drug List

The authorized drug list (ADL) contains the items approved by the Pharmacy and Therapeutics (P&T) Function for stock and use by sections and providers within your facility. Each section or provider will have its own specific ADL that must be adhered to and is covered by an inspection checklist.

In most cases, the ADL will also cover stock levels on approved items. When stock levels are inadequate or a certain medication need to be added to the list, the change must be submitted to the appropriate channels.

Also ensure you are checking expiration dates before use for individual use and at least monthly for entire inventory.

All deteriorated, outdated, or mislabeled medications will be removed from wards/clinics and returned to the pharmacy. Outdated and unused compounded sterile products (CSP) must be returned to the pharmacy for disposal or possible reuse. Depending on your MTF's guidance, this may be initiated by either pharmacy or ward/clinic personnel. It is important to identify and physically separate suspended or expired stock from other stock to avoid usage. Using these items could cause harm to our patients.

Ward/clinic personnel should monitor their drug storage areas carefully to ensure that product potency is retained through the manufacturer's labeled expiration date. Controlled temperature storage areas throughout the MTF, such as refrigeration or freezer units, should be monitored at least once daily and the results documented on a temperature log. Proper monitoring of temperatures is crucial because medications may become unstable or deteriorate if not stored properly; the temperature for refrigerators in wards and clinics should be between 35 and 46°F. Inspections must confirm compliance with appropriate storage conditions, separation of drugs and food, and proper use and maintenance of refrigeration logs.



END OF LESSON

## Lesson 2- Local Anesthetics

---

---

**After completing this lesson, the student will be able to apply local anesthetic agent procedures in accordance with prescribed guidance and publications.**

### Wound Care and Anesthetic

If you are working in an emergency room or surgical clinic, you will be involved in wound cleaning, debridement, and closure. Cleaning and debridement are done to remove foreign particles and dead or devitalized tissue from the wound. Wound closure is accomplished with adhesive strips, sutures, or staples. For this lesson, we will cover medications we commonly use prior to applying sutures.

Sutures are flexible materials placed through tissues with a needle to approximate the wound edges, decrease dead space in the wound, strengthen the wound until normal tensile strength returns, and minimize scarring. Before suturing, a local anesthetic is applied or injected into the area to be sutured to minimize the patient's pain.

## Administering Anesthetic Agents



Several anesthetic agents can be used to anesthetize the skin or parts of the body. There are three methods you should be familiar with to administer anesthetic agents: topical, local infiltration, and digital blocks.

The common steps to follow for all three methods prior to administration include the following process.

Step 1

## Step 1

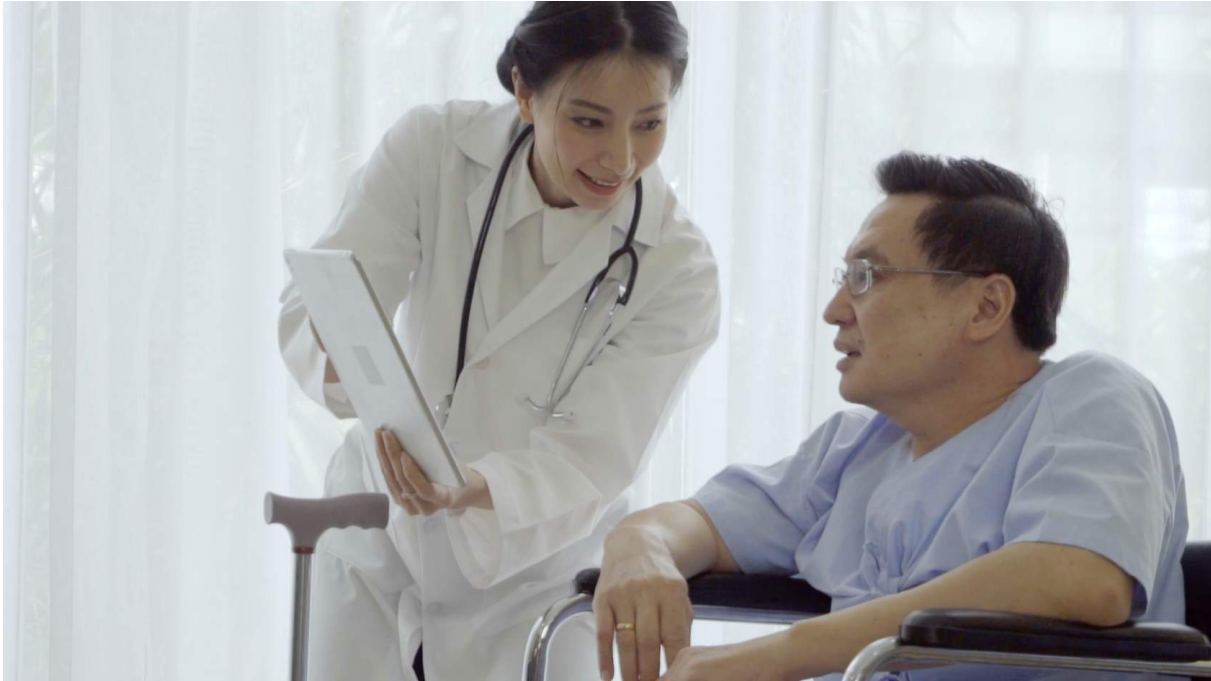


Verify physician orders.



## Step 2

### Step 2



Identify patient and explain the procedure and obtain written consent.

### Step 3

## Step 3



Gather supplies/equipment, wash hands, and don gloves.

Step 4

Step 4



Place the patient in a comfortable position with the affected area exposed.

## Step 5

### Step 5

## Six Rights of Medication Administration



Right **patient**



Right  
**medication**



Right **dose**



Right **time**



Right **route**



Right  
**documentation**

Verify the order using the Six Rights.

Step 6

Step 6



Ensure the patient is not allergic to cleaning agent or anesthetic agent.

## Step 7

### Step 7



Clean the site with an antimicrobial soap and water (or physician's preference) and allow to air dry.



## Step 8

### Step 8



Assess the patient's sensory awareness at the site before administering the anesthetic.

### Fill in the Blank

\_\_\_\_\_ are flexible materials placed through tissues with a needle to approximate the wound edges, decrease dead space in the wound, strengthen the wound until normal tensile strength returns, and minimize scarring.

Type your answer here

SUBMIT



Complete the content above before moving on.

## The Three Ways to Administer Anesthetic Agents

### TOPICAL ANESTHETIC

### LOCAL INFILTRATION

### DIGITAL BLOCK

Topical anesthetic agents come in many forms. The most common agent you may use will be a form of lidocaine (also known as xylocaine). Lidocaine cream or spray may be applied, most commonly to intact skin but can also be used on mucus membranes.

After completing the initial eight steps,

1. Apply the prescribed topical agent and wait 5–10 minutes.
2. Reassess the sensory awareness at the site and complete the required action.
3. Clean the area around the wound, apply dressing as necessary, and dispose of used supplies.
4. Wash your hands and document the procedure.



#### TOPICAL ANESTHETIC

#### LOCAL INFILTRATION

#### DIGITAL BLOCK

The next method of anesthetic agents, local infiltration (injection into body tissues), is a form of parenteral administration. This method will cause a break in the skin and is performed using aseptic techniques.

Lidocaine is also available in an injectable form with or without epinephrine and is commonly used for local infiltration. Lidocaine with epinephrine is used to decrease bleeding in the area by the vasoconstricting properties the epinephrine provides. Epinephrine also increases the duration of the anesthetic effect. There are some areas of the body where epinephrine must NOT be used because it may compromise the blood flow to a confined space. Those areas are digits (fingers and toes), the nose, ear or penis, or any flaps of skin.

Ensure you check with the provider before using any anesthetic agent. Most minor surgeries or laceration repairs will use a local anesthetic by using a needle and syringe to inject directly into the tissue immediately around the site to be sutured. This provides comfort for the patient while being sutured. When the anesthetic agent is injected into the skin and subcutaneous tissues, the nerve impulses from the area to the brain are blocked. When injecting the anesthetic, care must be taken

so the lidocaine is not injected into a vein by pulling back on your syringe and verifying no blood return before injecting. Injecting a local anesthetic intravenously can cause cardiovascular collapse or convulsions.

After completing the initial eight steps,

1. Draw the prescribed amount of anesthetic into a syringe, change the needle, and inject the agent into the superficial tissue around the site.
2. Wait 2–3 minutes and reassess sensory awareness. It may be necessary to administer additional anesthetic if the area is not numb. If this happens, check with the physician.
3. Once the area is numb, complete the procedure.
4. Clean the area around the wound, suture and/or apply dressing as required, and clean-up.
5. Wash your hands, document and give the patient follow up instructions.
6. Educate the patient on signs/symptoms to watch for such as increased pain, fever/chills, pus-like drainage, bleeding, or red streaks. Have the patient follow-up immediately if any of these signs or symptoms occur.



#### TOPICAL ANESTHETIC

#### LOCAL INFILTRATION

#### DIGITAL BLOCK

The last method of anesthetic agents is the digital block, another form of parenteral administration. This method will also be performed using aseptic techniques.

A digital block is a nerve block used to anesthetize digits, such as a finger, by affecting the bundle of nerves that serve that area. It is performed by injecting the anesthetic along the nerve path, not into the nerve. After the agent is injected, it takes a while for the area to become numb, however, the effects last longer. Do **NOT** use epinephrine for this procedure--or when injecting into the fingers, toes, or nose.

After completing the initial eight steps,

1. Draw the prescribed amount of anesthetic into a syringe, change the needle, and inject the agent along the nerve pathway on each side of the digit. You may lightly massage the site to ensure equal distribution of the anesthetic.
2. Wait 2–3 minutes and reassess sensory awareness. It may be necessary to administer additional anesthetic if the area is not numb. If this happens, check with the physician.
3. Once the area is numb, complete the procedure, clean the area around the wound, apply dressing as required, and clean up.
4. Ensure you give the patient the follow-up instructions including signs and symptoms to watch for.



### Multiple Choice

What nerve block is used to anesthetize digits, such as a finger, by affecting the bundle of nerves that serve that area?

---

- ☐ Topical anesthetic
- ☐ Local infiltration
- ☐ A digital block



SUBMIT

END OF LESSON

## Lesson 3- Blood Administration

---

---

**After completing this lesson, the student will be able to identify blood administration procedures in accordance with prescribed guidance and publications.**

### **Walking Blood Bank**

The decision to use fresh whole blood (FWB) should not be made lightly or by just anyone. To establish a walking blood bank (WBB), the decision must be made by a physician who is fully aware of the situation and resources available. The WBB should also only be established after a risk analysis that includes a medical intelligence assessment with infection prevalence and preventative force protection measures.



Some guidelines for the Walking Blood Bank Program are that the donors should be pre-screened and registered into the WBB Program. Donors are preferably military or DoD beneficiaries and low titer O. Some donors may not have been screened prior to giving blood and should only be considered if others are unavailable. The decision to use unscreened donors must be heavily weighed by risk/benefits, and adequately documented in patient's record. Another thing to remember about donors is that blood type on ID tags should be used as last resort, as they are sometimes wrong.

When beginning the process, only use authorized equipment for collection. The use of un-authorized supplies could result in contamination or coagulation of the blood. Prior to issuing FWB, rapid disease screen should be performed for HIV, HCV, and HBV. After

The blood can be refrigerated within 8 hours and stored for 21 days. (converts from FWB to SWB or stored whole blood).

Another guideline for the WBB Program is that the frequency of donation must be tracked. Members can only donate every eight weeks, because people who donate often may develop iron deficiency. Additionally, only one unit may be taken per donor, unless donors are severely needed. An absolute max of two units can be taken, but no more.

collection, the blood has to be used within 24 hours or destroyed if not used.

There are many risks associated with the WBB program. One risk is transfusion-transmitted infection. Out of approximately 10,000 FWB transfusions in United States (US) 1 will result in Hepatitis C, one with Human T-lymphocyte virus, and one fatality. There is also an increased risk of clerical errors. Lastly, the program is not FDA approved and not intended for routine use.



Packaged blood



Giving blood



Blood draw supplies

## Multiple Choice

Members can only donate blood every \_\_\_\_\_ weeks.

☐

8

☐

10

☐

12

☐

14

SUBMIT



Complete the content above before moving on.

## Administration of Blood Products to a Trauma Casualty in Tactical Field Care

Pre-hospital transfusions are becoming more common in civilian medicine that were already being used in combat casualty care. There are still many risks to giving whole blood products so giving it should be a medical provider's decision, and not made lightly. A list of criteria for the administration of whole blood could include a HR>100BPM, a SBP <100mmHg or no radial pulse, altered mental status with signs of hemorrhagic shock, penetrating trauma to chest/abdomen, junctional injuries, a pelvic fracture, and/or an above the knee or multiple amputations.

1

To start, you need to obtain IV/IO access.

2

Next you will verify blood product with the order given.

3

Lastly, you will connect IV tubing with filter to blood bag and transfuse as rapidly as possible.

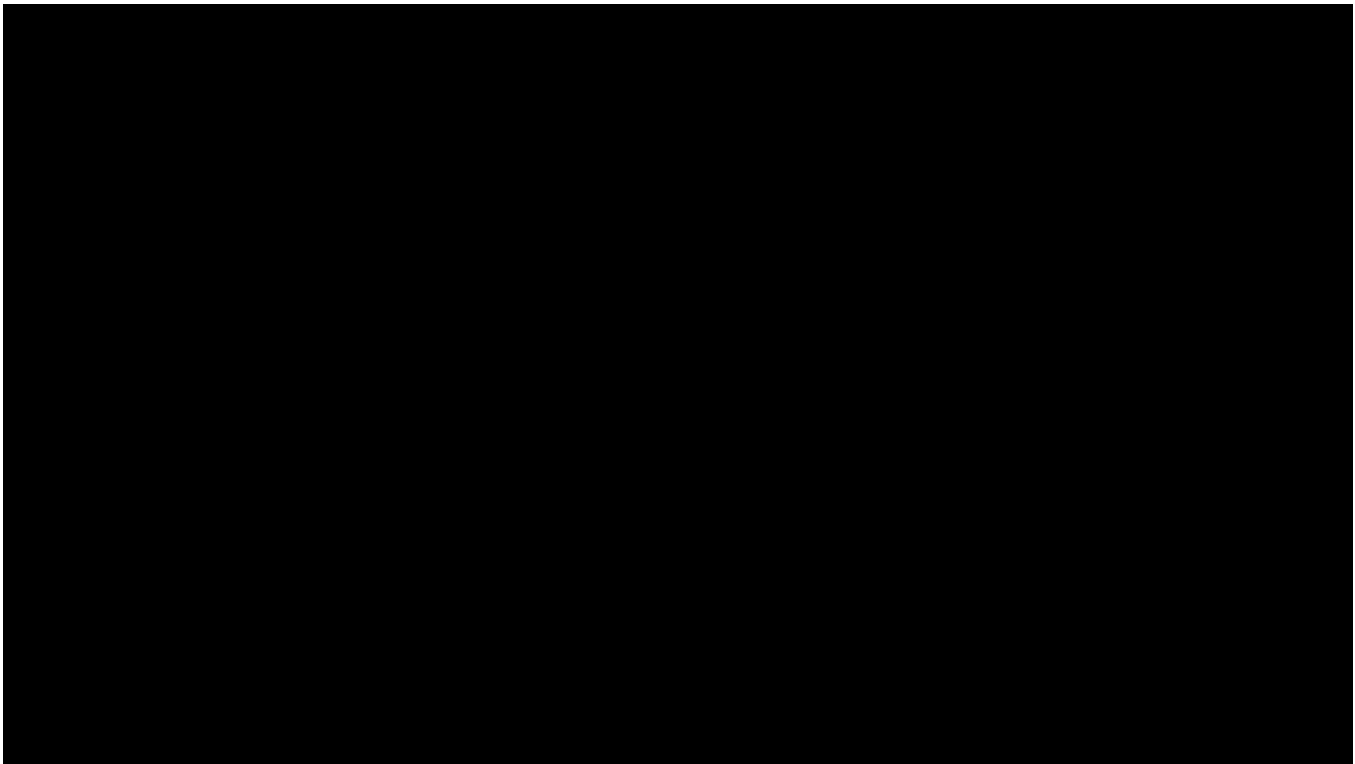
During the process you will monitor for signs of transfusion reaction characterized by hypotension, flushed face, wheezing, fever, rigor, anaphylaxis, or acute hemolytic reaction. This is done quickly and in a prehospital/tactical setting.

---

Watch the video below for an introduction on the phases of Tactical Combat Casualty Care (TCCC).

---





**Introduction to Tactical Combat Casualty Care (TCCC) Video  
Transcript.pdf**  
148 KB



The website below has numerous videos that will give you a good overview of Tactical  
Combat Casualty Care.

 **DEPLOYEDMEDICINE**

**Deployed Medicine**

Deployed Medicine is part of a ongoing research and development activity sponsored by the Defense Health Agency in partnership with the Joint Trauma System and Committee on Tactical Combat Casualty Care. Copyright © 2017 - Deployed Medicine - All Rights Reserved.

**READ MORE DEPLOYEDMEDICINE >**

CONTINUE



## Obtain Blood/Blood Products From Blood Bank

A transfusion is the IV administration of whole blood or blood products. This procedure restores lost blood volume or treats a variety of conditions, such as shock, anemia, and infections.

Transfusion therapy is common in medical facilities so you may be involved with it during your career.

Apart from a wartime or disaster scenario, you probably won't initiate a transfusion. That is the responsibility of a registered nurse (military or civilian) who does so only on the orders of a physician. Your responsibilities may include filling out forms and picking up blood products from the laboratory.

### **Standard Form (SF) 518, *Blood or Blood Component Transfusion***

This is the form you will fill out; it must be accurate and complete to avoid misidentification. Complete the form in triplicate and have the nurse or physician sign in the appropriate section(s). Normally, a separate SF Form 518 is initiated for each unit of blood. Follow your local policy when completing the form. Depending on the urgency, the form is either sent to the lab, or the lab is called to have a lab technician draw the blood sample. You may be required to verify the patient's identification when the lab technician draws the blood. Depending on the shift, you and the nurse may have to draw the blood sample. In a life-or-death situation, a physician may bypass getting a blood sample. Below is the SF 518 for you to review.



**SF 518.pdf**  
329.7 KB



CONTINUE

When picking up blood products from the lab you must be mindful of the timeframe from pickup to administration. Blood products should be kept as close as possible to their storage temperature until administered. Several policies specify a maximum of 30

minutes between the time blood is released from the blood bank and when the transfusion starts. If blood is in an insulated container (e.g., approved cooler) that maintains the required temperature, the time to start transfusion can be extended. Typically, unit refrigerators are NOT acceptable for storage of blood products. The temperature of such units is not sufficiently controlled to allow for safe storage. The best way to handle the storage problem is also the most obvious—don't pick up the blood until you and the nurse are ready to administer it!



When the nurse is ready for the transfusion unit, he or she calls the blood bank to authorize you to pick up the blood. When you go to the blood bank, you must verify the patient's name, social security number, blood type, ID number, donor unit number, and any other applicable information in the blood bank ledger, on the unit container and on the SF Form 518 before you take the unit out. In addition, check the expiration date on the blood unit and check it for abnormal cloudiness, clots, air, or colors. Once you verify all



the information, sign the ledger and take the blood product and two copies of the SF Form 518 back to your unit.



Blood Draw Photo

---

When you return to the unit, the nurse re-checks and examines the transfusion unit for unusual color, clots, and so forth, the expiration date, and compare the unit with the physician's orders to ensure that the correct product has been supplied. The nurse then takes the unit and the SF Form 518 to the patient's bedside to complete the ID process. The nurse verbally asks the patient's name and compares the information on the patient's ID band with the SF Form 518 and the unit itself.

Information that must be verified includes the facility, patient's name, ID number, blood type, donor number, and expiration date. If you are acting as a witness, you'll verify all the information. If all the information is correct, the nurse signs in the appropriate section of the SF Form 518 and you cosign. If there is any discrepancy, the unit is not transfused until the discrepancy is resolved.

### Multiple Response

What information must be verified from the patient's ID band? Mark all that apply.

---

☐

Patient's name

☐

ID number

☐

Blood type

☐

Sex

SUBMIT



Complete the content above before moving on.



The **most** common causes of **adverse reactions** to transfusion therapy are not correctly identifying the patient, blood products, or both. Since you may be required to fill out the identification portion of **SF Form 518** and act as a witness when the patient is identified, you are in a position to eliminate or reduce these errors. Knowing how blood is identified is **important**.



There are a variety of blood products the physician can order for the patient—whole blood, packed cells, platelets, plasma, and plasma derivatives. Generally speaking, the purpose and the product will be closely related (e.g., whole blood is given to replace blood loss, and platelets are given to help with clotting). To help you understand why the different types of transfusions are ordered, we briefly discuss the different blood products and indications for their use.

Whole blood is blood as it is drawn from a donor (plus an anticoagulant). Whole blood is used to treat patients who have had a massive blood loss, resulting in a need for both the oxygen-carrying capabilities of the red cells as well as the volume expansion of plasma. At one time, whole blood was the most common product used in transfusion therapy, however, technology has enabled medical personnel to break it down into basic components.

By doing so, many patients can be treated from a single unit. The risk of complications, such as a transfusion reaction or circulatory overload, is reduced because patients receive only what they need.



Packed cells, or packed red blood cells as they are more accurately called, are erythrocytes that are separated from plasma by centrifugation or sedimentation. Because packed cells increase the oxygen-carrying capacity of the blood without increasing its volume, they are useful in the treatment of diseases affecting erythrocyte production or destruction (i.e. acute or chronic anemia).

Platelets or thrombocytes are cell fragments involved in the clotting process. They are prepared by centrifuging whole blood units or by apheresis. A certain amount of blood is withdrawn from a donor and separated into components. The desired component is removed and the unit is reinfused into the donor. These units usually contain the platelets, some leukocytes and erythrocytes, and a small amount of plasma. Platelets are

transfused to increase the recipient's platelet concentration and treat clotting disorders, such as hemophilia and thrombocytopenia.

---

Plasma is the liquid portion of the blood prepared by removing the other components. It is used as a volume expander or to treat clotting-factor deficiencies and reverse the effects of anticoagulants.

---

Plasma derivatives are specific proteins that have been removed from the plasma for concentrated administration. They are used to treat various forms of hemophilia and specific clotting-factor disorders. They are also used as a blood-volume expander in the treatment of hypovolemia and shock, as well as provide specific and nonspecific immunity to a variety of disorders (e.g., tetanus, herpes zoster, hepatitis B, etc.).

In addition to these components, leukocytes can be separated from the blood to treat sepsis, infections that are unresponsive to antibiotics, or specific disorders, such as neutropenia or granulocytopenia. Blood or blood products also can be prepared in special manners to achieve different effects and reduce transfusion complications.

For example, washed red cells are prepared by adding and removing normal saline.

This depletes the leukocytes and plasma and reduces the possibility of febrile and incompatibility reactions. Irradiated blood products have been exposed to a radiation source to decrease the ability of the donor lymphocytes to engraft and divide. Other special preparations include prewarmed blood products and microaggregate filtered blood. Blood products are warmed to reduce the possibility of arrhythmias during massive rapid transfusions, for exchange transfusions in infants, and patients with cold agglutinin disease. Microaggregate filters are used to remove aggregated leukocytes and platelets during whole-blood transfusions and to reduce the possibility of febrile reactions.

## CONTINUE

### Monitor Patient for Adverse Reactions During Blood Transfusion

Before we dive into monitoring the patient for adverse reactions, in addition to filling out forms and picking up blood products, you may be assisting the nurse who initiates the transfusion. You may have the opportunity to assemble the equipment and transfusion set. However, your main duty as a medical technician will be obtaining vital signs, ensuring the patient stays stable, and whatever else is necessary. The nurse primes the tubing, cleans the site, applies the tourniquet, and starts the transfusion.

Blood transfusions are extremely risky procedures associated with numerous adverse reactions. After the transfusion is initiated, allow it to run slowly for the first 15–30 minutes; then observe the patient closely. If there are no signs of overloading or adverse reactions, you can increase the flow rate. The patient should be monitored closely both during and after the transfusion.

Monitoring timeline:

- Obtain baseline vital signs, at the start of the transfusion.
- Record vitals every five minutes for three cycles.
- Record vitals every 30 minutes for two cycles.
- Record vitals every hour until transfusion is complete.



Obtain last set of vital signs one hour after the transfusion.



If patient has a reaction, stop the transfusion immediately, but maintain an open line (0.9 normal saline) for emergency medications. Immediately notify the physician and nurse, and initiate emergency resuscitative measures as needed. Any remaining blood or blood product should be sent to the lab immediately along with the administration set for laboratory analysis.

Transfusion complications can be divided into two major groups:

1

Immediate transfusion reactions seen within 48 hours of blood administration,

2

Delayed transfusion reactions and transmission of disease. Specific reactions include allergic reactions, febrile reactions, septic reactions, hemolytic reactions, circulatory overload, and air embolism.

Allergic reactions are the result of sensitivity to one of the plasma proteins or to a donor antibody. The reactions may be indicated by anything from a simple rash, itching, and hives to respiratory congestion, pulmonary edema, and anaphylaxis.

If the patient exhibits severe symptoms, stop the transfusion immediately and be prepared to administer emergency drugs (e.g., epinephrine, Benadryl) and perform emergency resuscitation. If the only sign of allergic response is a mild rash, you may continue the transfusion at a slow rate, but you should monitor the patient continuously. Let the nurse decide which course of action to take.





### **Febrile, Nonhemolytic Reactions**

Febrile, nonhemolytic reactions are usually caused by hypersensitivity to the donor white cells, platelets, or plasma proteins. Signs and symptoms include sudden chills, fever, headache, flushing, and anxiety.

Stop the transfusion immediately if any of these symptoms occur, and send the remaining blood, tubing, and a blood and urine specimen to the lab for analysis. Continue to monitor the patient's temperature at least every half hour and give antipyretics as directed by the physician.



## Septic Reactions —

Septic reactions are caused by transfusion of contaminated blood or blood products. Indicators are sudden chills, high fever, vomiting, diarrhea, and severe hypotension. Stop the transfusion and send the blood and tubing back to the lab, along with cultures of the patient's blood. Administer antibiotics and other medications as directed by the physician. Limiting the time blood released from the blood bank and when the transfusion starts will prevent septic reactions.

Inspect the blood carefully for bubbles, clotting, or abnormal color before the transfusion, and complete the transfusion within four hours. In addition, changing the tubing after every administration or every other administration (determined by local policy) will also limit the possibility of septic reactions.



## Hemolytic Reactions —

Hemolytic reactions are caused by transfusion of incompatible blood products. Either the recipient's plasma antibodies attach to the donor cells and cause hemolysis, or the donor antibodies attach to the recipient cells and cause hemolysis. In either case, the symptoms include chills, fever, low-back pain, constricting chest pain, flushing, feeling of head fullness (e.g., headache, sinus infection, concussion, brain tumor), tachycardia, tachypnea, hypotension, vascular collapse, hemoglobinuria, bleeding, and acute renal failure. Immediate action is required to save the patient's life. Stop the transfusion but keep the line open.

Notify the physician and blood bank. Collect urine and blood samples and maintain the blood pressure with fluids and medications as directed. Insert a catheter and record hourly outputs. The patient's chances are greatly increased if the indications are detected early by constant monitoring and a slow, initial flow rate.



Circulatory overload is too much fluid in the system. The excess fluid backs up into the pulmonary vessels, causing decreased lung compliance. Circulatory overload is indicated by a rise in venous pressure, distended neck veins, dyspnea, coughing, and rales (i.e., crackling sensation at the base of the lungs). Stop the transfusion, place the patient in a sitting position, and administer oxygen, diuretics, and other medications as ordered.

Air embolism, although unlikely, has a greater risk of occurring during a transfusion. It can happen when units are changed or when the patient is transported while the transfusion is in

There is no acute treatment for a delayed hemolytic reaction unless the patient goes into shock, and then it is managed as an immediate hemolytic reaction. Performing the cross match (donor-recipient compatibility) within 48 hours of the transfusion may prevent such delayed reactions. The diseases that may be transmitted through contaminated blood transfusions include hepatitis, malaria, AIDS, and syphilis. Again, the best treatment is prevention. A careful screening program and minimal use of whole blood is the best approach.

Graft-versus-host reactions occur when transfused donor lymphocytes engraft and multiply in the bone marrow of an immunodeficient recipient. Signs and symptoms may include a mild, red maculopapular

progress. Indications include cyanosis (i.e., bluish discoloration of the skin) and circulatory collapse. If an air embolism does occur, place the patient on his or her left side with the head in a dependent position and administer 100 percent oxygen.

Delayed hemolytic reactions may occur days or months after a transfusion. They include disease transmission and other reactions (e.g., graft-versus-host disease and hemosiderosis). A delayed hemolytic reaction occurs when red cells are destroyed by an antibody that was not detected during the cross match.

Indications of this reaction include fever, jaundice, and a decreased hematocrit.

rash, ulcerations, contractures, mucosal degeneration, and hepatosplenomegaly. Administer medications and solutions as directed.

Hemosiderosis or iron overload is caused by deposits of iron in the patient's heart, endocrine organs, liver, spleen, skin, and other major organs from multiple, long-term transfusions. This condition can be characterized by diabetes, decreased thyroid function, arrhythmias, and congestive heart failure. Treatment is generally symptomatic per physician's orders.

## Multiple Choice

This is caused by a transfusion of contaminated blood or blood products and some indicators are sudden chills, high fever, vomiting, diarrhea, and severe hypotension.



Hemolytic

☐ Febrile, nonhemolytic

☐ Septic reactions

☐ Hemosiderosis

SUBMIT

END OF LESSON