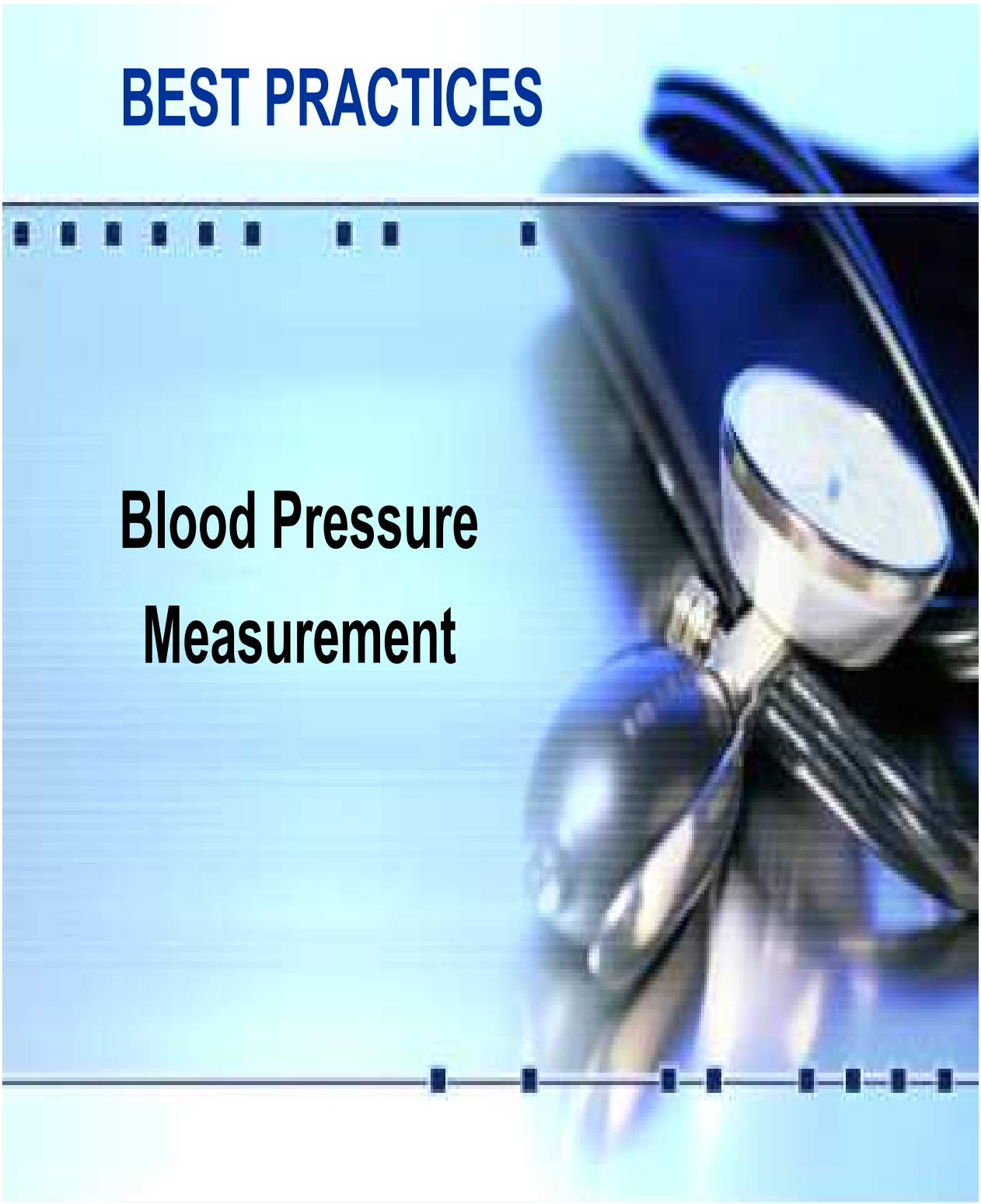
NORTHWEST
Kidney Centers

BEST PRACTICES



Blood Pressure Measurement

Objectives

On completion of this learning packet you will be able to…

1. Explain why using the correct size blood pressure cuff is essential to getting accurate measurements.

2. Identify 4 common errors that can lead to inaccurate blood pressure measurement.

3. List 2 reasons why it is generally recommended that blood pressures not be taken over clothing.

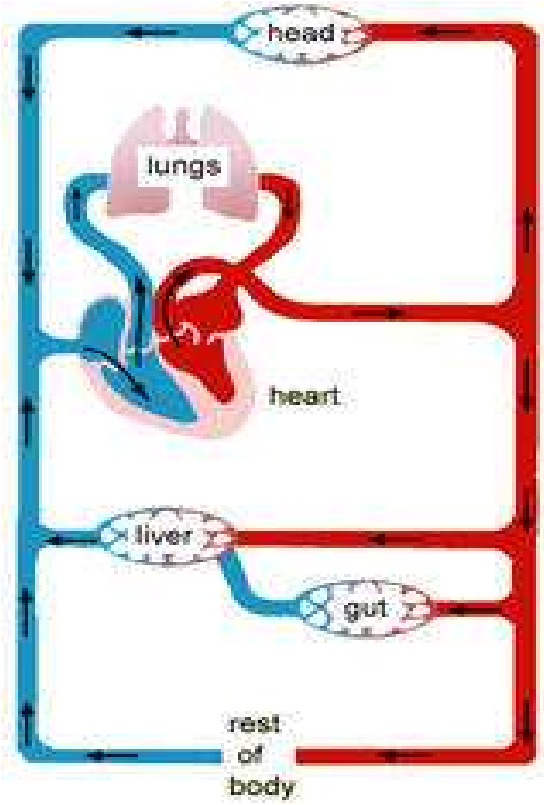
4. Explain in your own words how a BP cuff is applied to an upper extremity.

5. Explain how the patient should be seated when taking a sitting blood pressure.

6. Identify when to report blood pressure readings to the charge nurse.

What is blood pressure?

Why is blood pressure measurement so important pre, during and post dialysis?



What is blood pressure?

The easiest way to think about the vascular system is to think of it as a closed loop beginning and ending with the heart. As the left ventricle contracts it creates enough force to eject the blood it contains into the aorta and out into the arteries. The arteries contract and expand as needed in response to pressure and chemical sensors. That keeps the blood flow moving through the arterial system, into the veins and back to heart.

Blood pressure is determined by the strength of the heart beat, the volume of blood being pumped, and the elasticity and muscular tone of the vessels. When you take a blood pressure you are indirectly measuring the pressure generated against the arterial vessel walls as the blood moves through them.

You read the pressure when the heart is contracting (systolic blood pressure) and again while the heart is relaxing (diastolic blood pressure).

What factors affect blood pressure?

Many factors affect blood pressure. For our purposes we need to talk about …

1. Factors related to the patient.
2. Factors related to the care giver and environment.

Dialysis itself will affect blood pressure. We are usually trying to remove excess fluid, so the patient will leave dialysis at their dry weight and with a normal blood pressure. Patients can develop hypotension. Low blood pressure can result in symptoms such as dizziness, sweating, nausea, vomiting, and muscle cramping. As blood pressure continues to go down the patient may pass out, have seizures or even go into cardiac arrest. **Symptomatic hypotension has been reported to occur in 20-50% of hemodialysis patient treatments.**[1]

Other factors that affect blood pressure include medications, age, and the presence of other illnesses. The average dialysis patient takes 19 pills a day.[2] Some of those medications have a direct affect on blood pressure. The presence of other illnesses such as diabetes, high blood pressure, congestive heart failure, or a previous heart attack may also hjave a direct effect on the body's normal responses to fluid removal. That puts patients at an increased risk for hypotension and other dialysis related problems. Finally, the majority of our patients are 65 or older. As we age our cardiovascular system loses some of its ability to regulate and maintain blood pressure.

The bottom line is that most of our patients are dealing with multiple factors that impact their dialysis treatments and the blood pressures you take. **Even if your patient looks healthy, you must remember that all of our patients are medically complex and usually dealing with multiple medical conditions. This is why we monitor patients so closely during treatment.**

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[1] Counts,Caroline, Core Curriculum for Nephrology Nursing, Fifth Edition 2008, Complications of Hemodialysis-Prevention and Management, 704

[2] Bray, Susan MD,MBE,FACP The Importance of Managing Medications for Patients with Kidney Disease, aakpRENALIFE, September 2010

Now we need to consider the impact that coming to dialysis and the dialysis unit environment can have on patient blood pressures. Coming to dialysis can be anxiety producing for many patients. They may be thinking about their access and having needles inserted, dialysis side effects, transportation issues, chair comfort, time pressures and even the other patients and staff they are going to be interacting with. At the same time they may simply be thinking about whether or not they will have the energy after dialysis to get through all of their daily activities

Dialysis units are busy places. People are coming and going. Phones are ringing. Machines are alarming, and there can even be an occasional emergency being managed. Usually dialysis units are constructed as one big room so there is very little privacy. Dialysis units are not relaxing environments. The activity, noise, and physical characteristics of the units can contribute to patient anxiety and that can result in increased blood pressures.

Hypotension occurs in_____to_____% of hemodialysis treatments.

List 3 patient factors that may contribute to hypotension during dialysis?

1._____

2._____

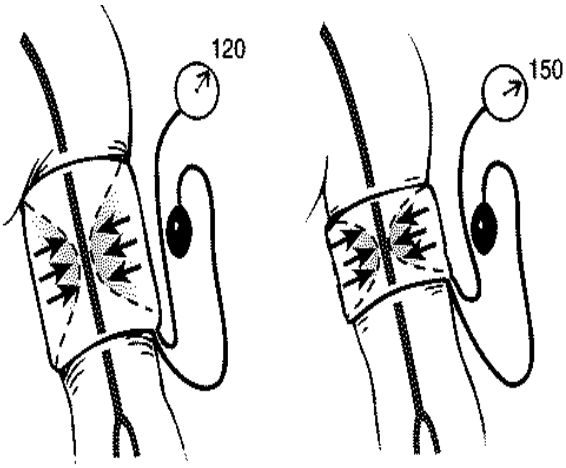
3._____

What is the patient care giver's role in accurate blood pressure measurement?

What can you do to assist your patients and facilitate accurate blood pressure measurements? We have identified a lot of factors that impact blood pressures. Some you have control or influence over and others you do not. **It is important that you are aware of the specific things you can do to ensure that the blood pressures you take are as accurate as possible.**

Blood Pressure Measurement Equipment

Correct Equipment: You cannot take accurate blood pressures if the equipment you use is not appropriate for the individual patient and /or is not in good working order. Equipment that is not in good working order should be removed from circulation and given the unit Facility Systems Specialist. We need to talk about using the correct blood pressure cuff size, stethoscopes, the dialysis machine for automated blood pressures, and the use of manual aneroid manometers (gauges).



Blood Pressures Cuffs: Usually you will take blood pressures in the non-access upper arm. To produce accurate pressures the cuff must be the appropriate size for the patient's extremity. This is true for both automated and manual pressures. Blood pressure cuffs that are too large will produce pressures that are lower than the patient's true blood pressure. Blood pressure cuffs that are too small will produce pressures that are higher than the patient's true blood pressure. Nursing staff periodically measure each patient's upper arm circumference using anatomic landmarks to determine the correct cuff size. That is then entered into our electronic medical record where you will see it prior to each treatment. You should always use the cuff size indicated in the medical record.

If the cuff size is not recorded in the electronic medical record there is another way to determine cuff size. Make sure that the length of the blood pressure cuff bladder covers 80% of the circumference the patient's arm.

<u>Remember, accuracy is important. You make clinical treatment decisions based in part on the blood pressures you take. This can have a significant impact on treatment effectiveness and patient safety.</u>

Where do you find out what the correct blood pressure cuff size is for each patient? _____

Cuff Positioning: To do an upper arm blood pressure the brachial artery should be palpated in the bend of the arm (antecubital fossa) and the bladder of the cuff should be centered over that spot. The lower edge of the cuff should be up far enough on the patient's arm (an inch or so) to allow for stethoscope placement. The cuff should not touch the stethoscope as it can produce artifact noise. The cuff should fit smoothly and snuggly around the arm.

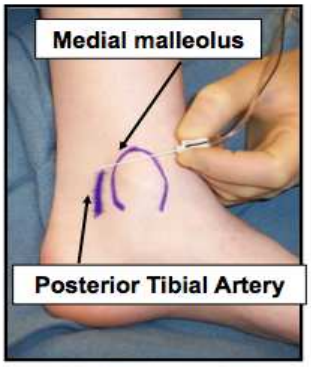
Occasionally, you will have a patient who needs their blood pressures taken on a forearm (a wrist pressure), thigh (a popliteal pressure), or at the ankle (a dorsalis pedis or posterior tibial pressure). As with the upper arm pressure you will need the correct size cuff. The cuff bladder should be centered over the artery, and the cuff should be located where there is enough room for the stethoscope (for thigh/popliteal artery pressures) to be placed without touching the cuff itself. The 80% rule still applies as mentioned above. Blood pressures taken at the wrist or ankles are more difficult. You may have to estimate the systolic pressure by palpation. The diastolic is hard to determine this way but can be estimated by observing the point where the gauge pulsation stops. Palpated pressures provide an estimate of the patient's blood pressure. It is a baseline that will allow you to recognize when the patient's blood pressure changes during treatment. Cuff measurement, placement, and the degree of accuracy using these areas can be difficult. Some patients will have their own special cuffs for wrist pressures. They will bring those to each treatment. There are specific criteria that have to be met before the alternate sites can be used. A physician's order is required to regularly use any of the alternate sites. **(See Policy Manager/Clinical Dialysis/Patient Care-Maximizing Blood Pressure Measurement Accuracy Equipment and Processes.)**

Alternate Arteries for Blood Pressure Measurement

Radial

Popliteal

Dorsalis Pedis



Manual Blood Pressure Gauges (Syphygmanometers): Before you take a manual blood pressure make sure that the gauge indicator is at the bottom (zero point) of the dial. If not, the gauge needs to be calibrated and should not be used. To read the gauge accurately it needs to be placed at eye level so you are looking directly at the numbers and increments. If not you may read the blood pressure as either too high or low.

Blood pressure cuffs that are too small produce inaccurately_____ blood pressures. (High or Low)

Stethoscopes: You can hear blood pressures using either a stethoscope diaphragm or a bell. If you have a stethoscope with both a diaphragm and a bell you may want to try taking blood pressures using the bell. The bell is designed to pick up lower frequency sounds like those produced when blood pressures are taken. The diaphragm is designed to pick up higher frequency sounds such as those produced when listening to lung sound.

Manual verses Automated Blood Pressures: The principles related to the use of blood pressures cuffs and their placement, are the same for both manual and automated pressure measurements. In the dialysis unit most blood pressures are taken using the dialysis machines. Anytime a patient needs their blood pressure taken and they are not in the dialysis station you will have to take it manually. **It is important that you practice and maintain that skill.**

List 3 things about blood pressure cuffs you should check before taking a manual blood pressure.

1._____
2._____
3._____

You have a new patient and their blood pressure cuff size is not in the electronic medical record. How would you check to make sure that you are using the correct size cuff?

_____
_____
_____

Blood Pressure Measurement Recommendations

The American Heart Association

Patient Preparation: According to the American Heart Association [3]

1. Things like exercise, nicotine consumption; talking, arm positioning, muscle tension and back ground noise can have a major impact on blood pressure measurement accuracy.
2. The cuff should be placed on a bare arm. (The reason that the AHA encourages the use of a bare arm or other extremity is that layers of clothes can have a dampening effect on the transmission of the pulse or sound. In some cases it can also produce artifact noise that makes obtaining an accurate pressure difficult and increases the chance or error.)
3. The patient should be comfortably seated, with the legs uncrossed, and the back and arm supported. If the back is not supported the dialstolic blood pressure may be increased by 6 mm Hg. Crossed legs can increase the systolic blood pressure by 2-8 mm Hg.
4. The cuff should be level with the heart. (See picture below.) That means that in the sitting position it should be level with the midpoint of the sternum. In the supine position the arm should be supported with a pillow. If the upper arm cuff is below the level of the heart the readings will be too high. If the arm is above the level of the heart they will be too low. The differences can be 10 mm Hg. or more.

5. The patient should relax as much as possible and not talk during the procedure. Ideally 5 minutes should elapse before the first reading is taken.

[3] Pickering, Thomas G. et al: Hypertension, Journal of the American Heart Association, 2005, p 142-161

Cuff Size: For our purposes the cuff size is recorded in the electronic medical record and appears each run on the Alert Screen. Those measurements are done by nursing staff based on anatomical landmarks. The AHA uses the previously mentioned cuff bladder length as encircling 80% of the upper arm circumference. They add an additional measure. That is cuff width should encircle about 40% of the upper arm circumference.

Cuff and Stethoscope Placement: For upper arm pressures the brachial artery should be palpated at the bend in the arm (antecubital fossa). The bladder of the cuff should be centered over that spot. The lower edge of the cuff should be an inch above bend in the arm to allow for stethoscope placement. The cuff should not touch the stethoscope as it can produce artifact noise. The cuff should be placed snugly around the arm. Neither the patient nor the caregiver should be talking during measurement.

Inflation and Deflation: The cuff should be inflated to 30 mm Hg. over the point where the radial pulse disappears. The rate of deflation should be 2-3 mm Hg per second. The reading should be made to the nearest 2 mm Hg. The blood pressure module in the dialysis machines manages both inflation and deflation. It is based on sensing the pulse and during treatment the previous blood pressure taken.

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The blood pressure cuff should be level with the heart. The American Heart Association suggests that:

1. **Patients sitting in chairs should have their blood pressure cuff placed so it is level with the _____.**
2. **Patients in bed should have their blood pressure taken while they are lying on their backs. Even with this positioning a _____may be needed to elevate the arm and cuff so it is at heart level.**

If a patient is sitting on the edge of their dialysis chair and their back is not supported, you can expect to see about a _____mm Hg increase in their _____pressure.

The NKC Skill Competency Checklist
Taking Blood Pressures

Our CMS regulations specify that patient care staff must be able to demonstrate the competencies required to serve the complex needs of our patients and sustain those skills over time. Blood pressure measurement technique is one of those skills. **The goal of this process is to assure that the blood pressures you take are as consistent and accurate as possible.** At the end of the 8 week NKC Orientation Program this checklist is completed for the first time by one of the Clinical Educators. It is then added to the other orientation documentation. Periodically, you will be reviewing the technique for taking blood pressures and a designated nurse from your facility will be completing the checklist. The completed checklist will be kept in your unit personnel file as part of your overall ongoing competency documentation. This checklist can also be found in **Policy Manager under Forms and Attachments-Education Services.**

Please take some time to familiarize yourself with the following:

NKC Skill Competency Checklist

and

NKC Policy: Maximizing Blood Pressure Measurement Accuracy Equipment and Processes

NKC SKILL COMPETENCY CHECKLIST
TAKING BLOOD PRESSURES

V-TAG: V680, V681 - All facility staff must be able to demonstrate competency required to serve the complex needs of dialysis patients and must have the ability to sustain and demonstrate skills needed to perform the specific duties of their position.

GOAL: To take blood pressures manually or by use of the machine automated cuff, following procedure so as to assure consistent and accurate measurements.

Clinical Skill/Task	Satisfactory Demo of Skill	Comments
Prepare the patient:		
1. Gather the equipment and make sure that the equipment is in good working order:		
• Aneroid gauge at zero		
• Stethoscope		
• Cuff is the correct size as noted on the Alert Screen in the medical record. **(Or if size is not noted)** • Cuff bladder covers at least 80% of the arm circumference.		
• Check BP's in medical record. Note highest recent BP.		
2. Position cuff on bare extremity:		
• Expose antecubital fossa		
• Bladder centered over artery		
• Lower boarder of cuff one inch above antecubital space.		
• Cuff snuggly/smoothly applied with the extremity unrestricted.		
3. Have the patient relax for 5 minutes		
4. Ensure that patient is in the correct position.		
Sitting BP: • Back supported		
• Legs uncrossed		
• Feet flat on the ground.		
• Brachial artery at heart level.		
Lying BP: • Patient supine.		
• Pillow under extremity to raise cuff to heart level.		

Clinical Skill/Task	Satisfactory Return Demo	Comments
5. Palpate the brachial artery and apply the stethoscope (bell if you have one) over the artery.		
6. Inflate the cuff:		
• **Manual BP**: Inflate to 30 points over highest recent BP in medical record.		
• Machine: Automatic inflation		
7. Deflate the cuff: • **Manual B/P**: Listen for systolic and diastolic while *slowly* deflating cuff at about 2-3mmHg per second		
• Release the remaining pressure in the cuff.		
• Machine = automatic deflation		
8. **Manual BP:** Document in medical record. (Automatically downloaded if taken by machine).		
9. To repeat BP wait at least 1-2 minutes for blood in the extremity to be released and flowing normally.		
10. Can explain how and when modified BP techniques can be used for thigh, ankle and wrist pressures.		
• Correct patient position		
• Correct site (popliteal, dorsalis pedis, posterior tibial, radial)		
• Correct cuff size and placement		

Comments: _____

_____

_____

_____

_____

Maximizing Blood Pressure Measurement Accuracy Equipment and Processes

APPLICATION:

This policy applies to all NKC patient care units.

Purpose:

Blood pressure is an important indicator of cardiovascular health. Blood pressure measurements are one of the most important tools used to manage patient treatment plans both on and off of dialysis. Obtaining accurate blood pressure measurements during center dialysis treatments can be a challenge. Standardization of equipment and processes is one way to promote quality blood pressure measurement pre, during and post dialysis treatment.

Policy

1. Braun blood pressure cuffs are available and conveniently located in each unit.
2 The cuffs come in 4 sizes. (Small Adult, Adult , Large Adult, Thigh)
3. Each patient is assigned a cuff size.
4. **B**lood pressure cuff checks are completed by Technical Services or the unit FSS. Worn cuffs are identified, logged into a database to evaluate longevity trends, and replaced as needed. **(See Policy Manager-Technical Services-Medical Equipment-Maintenance- Annual Blood Pressure Cuff-Set Checks)**
5. The Nurse Patient Educator / Case Managers are responsible for determination of cuff size and documentation in cyberRen.
6. **Blood pressures are routinely taken in an upper arm. A physician order is required to take blood pressures in other locations. Dialysis should not be delayed to obtain the order, but follow up must be done to ensure that the order is obtained and entered into cyberRen.**

Procedure

1. Cuff size is determined for each new patient and then annually thereafter as part of the Comprehensive Assessment and Plan of Care process.
2. Cuff assignment is re-evaluated when:
    a. Patients gain or lose enough weight for the cuff size to be affected.
    b. There is a change in the location or extremity utilized to measure blood pressures.

3. Cuff size determination:

   a. Upper Arms: Ideally the cuff bladder should encircle 80% of the arm circumference. Upper arm circumferences are taken using anatomical landmarks to determine the mid-point between the Acromion and Radius.

   b. Forearm: If the cuff width is greater than the upper arm length the forearm should be used and wrist pressures taken.

   c. Lower Extremity:

      (1.) BP at the Knee: Circumference measurement mid thigh.

      (2.) BP at the Ankle: Lower edge of cuff 1 inch above protuberances.

4. Documentation:

   a. Cuff size and the location where the patient's blood pressures are taken is recorded in cyberRen under **Examination Summary (blue stethoscope icon)/BP Cuff Size_In Center/Examination Detail/Numeric.**

   b. Cuff size and the location where the patient's blood pressure is taken is also recorded on the **Nurses Worksheet under Dialysis Needs/Reminders or Miscellaneous.** This allows the information to pulled to the **Alert Screen under Appointments and Reminders** each treatment.