

# AMITY

## HEALTHCARE GROUP

### Venipuncture, home care

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#### ■ Introduction

Venipuncture is the method for obtaining a venous blood sample. It involves puncturing a patient's vein with a needle or winged (butterfly) collection device to collect blood in an evacuated tube or a syringe. Blood collection using a syringe requires cautious transfer of blood to the appropriate tubes using a needleless device to prevent needlestick injury. Depressing the syringe plunger during transfer may create positive pressure, displacing the stopper and potentially allowing exposure to the patient's blood. Using a syringe also may result in overfilling or underfilling tubes with blood, leading to inaccurate test results.<sup>[1]</sup>

When possible, perform venipuncture for phlebotomy in the extremity opposite an IV infusion. If it's necessary to withdraw a sample in an extremity with a vascular access device infusion, use a vein below or distal to the device or infusion. Don't perform venipuncture on the side of the body on which the patient has had lymphedema or has undergone radiation therapy or breast surgery with axillary lymph node dissection. Also avoid venipuncture in an extremity with an alteration in blood flow, such as an extremity that has been affected by stroke, injury, or deformity. The preferred site for venipuncture is the **antecubital fossa**, because veins in this area are accessible and their use is associated with lower rates of hemolysis.<sup>[1][2][3][4]</sup> Restrict venipuncture to the hand in patients with an actual or planned dialysis graft or fistula.<sup>[2]</sup>

Because phlebotomy contributes to phlebotomy-associated blood loss and anemia, limit collection to only the necessary amount of blood for accurate testing. Whenever possible, the health care team should also implement blood conservation strategies, such as using low-volume blood collection tubes, employing point-of-care testing methods (when available), and collaborating with the practitioner to avoid unnecessary testing.<sup>[2][5]</sup> Before undergoing venipuncture, the patient should undergo assessment for possible risks, including anticoagulant therapy, a low platelet count, bleeding disorders, and other abnormalities that increase the risk of bleeding and hematoma formation.

#### ■ Equipment

- Gloves
- Fluid-impermeable pad(s)
- Appropriately sized syringe or blood collection tube holder
- Antiseptic agent (preferably alcohol-based chlorhexidine; if contraindicated, an iodophor [such as povidone-iodine] or 70% alcohol)
- Blood collection tubes
- 21G to 23G venipuncture needle or winged (butterfly) collection device
- Single-use tourniquet
- Gauze pads
- Adhesive bandage
- Puncture-resistant sharps disposal container
- Labels
- Laboratory biohazard transport bag
- Laboratory requisition form
- Written educational materials
- Optional: gown, mask with a face shield or a mask and goggles, blood pressure cuff, needleless transfer device, refrigerator or temperature control packs and an insulated container

#### ■ Preparation of Equipment

Inspect all equipment and supplies. If a product is expired, is defective, or has compromised integrity, remove it from patient use, label it as expired or defective, and report the expiration or defect as directed by your agency.<sup>[5][6]</sup> Gather the appropriate collection tubes for the ordered laboratory tests. (See [Collection tube guide](#).)













**COLLECTION TUBE GUIDE**

Blood collection tubes come in various sizes and fill by vacuum when you pierce the stopper. The amount of blood collected in each tube is predetermined by the tube type and the test for which the tube is intended. The maximum draw volume for each size tube commonly is indicated by a mark that is the same color as the stopper or closure, found at the top of the label when holding the tube upright. Fill the tubes to at least 90% capacity or according to the manufacturer's recommendations *to ensure accurate test results.*<sup>[2][5]</sup>

Most tube types contain additives in varying concentrations. Obtaining blood samples in the correct order is essential, *because contamination from an additive in a previous collection tube may cause erroneous test results.*<sup>[2][4][5][7][8]</sup> In addition, the additive in the tube must be mixed with the blood sample; this step can be achieved by holding the tube upright and inverting it gently 180 degrees and back immediately after drawing the blood. The number of inversions varies by tube type.

The table below shows commonly used collection tubes in the recommended collection order, stopper or closure color, and number of inversions necessary at blood collection. Consult laboratory personnel for information about less commonly ordered tests.

Order of draw	Collection tube type	Stopper or closure color	Common laboratory use	Number of inversions required to mix sample properly
1	Blood culture or another sterile test	<ul style="list-style-type: none"> <li>Blood culture bottles</li> </ul>	<ul style="list-style-type: none"> <li>Blood culture (ideally, blood specimens for culture should be drawn from two to three blood draws from separate venipuncture sites, not through a vascular catheter)<sup>[2]</sup></li> </ul>	8 to 10
2	Citrate	<ul style="list-style-type: none"> <li>Blue stopper (tube must be filled completely)</li> </ul> 	<ul style="list-style-type: none"> <li>Coagulation studies</li> </ul>	3 to 4
3	Gel, serum	<ul style="list-style-type: none"> <li>Red and black stopper</li> </ul>  <ul style="list-style-type: none"> <li>Gold closure</li> </ul> 	<ul style="list-style-type: none"> <li>Serum chemistry</li> <li>Routine blood donor screening</li> </ul>	5

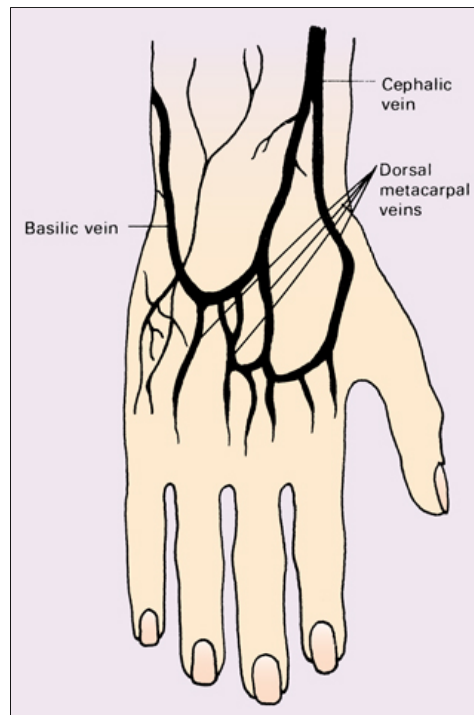
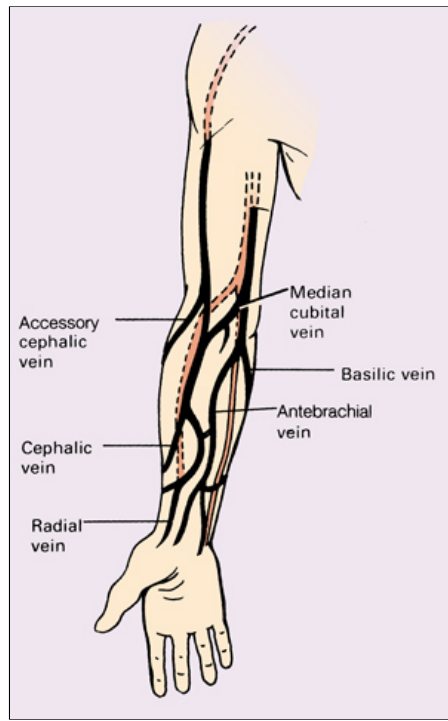
4	No gel, serum	<ul style="list-style-type: none"> <li>Red stopper or closure</li> </ul> 	<ul style="list-style-type: none"> <li>Serum chemistry</li> <li>Routine blood donor screening</li> </ul>	5 (plastic), 0 (glass)
5	Heparin	<ul style="list-style-type: none"> <li>Green stopper or closure</li> </ul>  <ul style="list-style-type: none"> <li>Green and gray stopper or light green closure</li> </ul> 	<ul style="list-style-type: none"> <li>Plasma chemistry</li> </ul>	8 to 10
6	Ethylenediaminetetraacetic acid (EDTA)	<ul style="list-style-type: none"> <li>Lavender stopper or closure</li> </ul>  <ul style="list-style-type: none"> <li>Pink stopper or closure</li> </ul> 	<ul style="list-style-type: none"> <li>Whole-blood hematology</li> <li>Routine immunohematology and blood donor screening</li> <li>Cross-matching (pink stopper or closure: tube contains special label for required blood bank information)</li> </ul>	8 to 10
7	Potassium EDTA	<ul style="list-style-type: none"> <li>White closure</li> </ul> 	<ul style="list-style-type: none"> <li>Molecular diagnostic testing</li> </ul>	8 to 10
8	Sodium fluoride	<ul style="list-style-type: none"> <li>Gray stopper or closure</li> </ul> 	<ul style="list-style-type: none"> <li>Glucose testing</li> </ul>	8 to 10

## ■ Implementation

- Review the referral information, plan of care, and prior home visit documentation if available.<sup>9</sup>
- Verify the practitioner's orders *to determine the required laboratory tests*.<sup>5 | 10 | 11 | 12 | 13</sup>
- Review the patient's medical record for conditions that increase the risk of bleeding and hematoma formation and for allergies to antiseptics, adhesive, or latex (if used by your agency). Also, check the patient's medical record for factors that may affect peripheral vasculature, such as conditions that result in structural vessel changes, a history of frequent venipuncture or lengthy infusion therapy, skin variations, skin alterations, patient age, obesity, or fluid volume deficit, *to determine the need for vascular visualization technology*.<sup>3 | 4 | 14 | 15</sup>
- Gather and prepare the necessary equipment and supplies.
- Introduce yourself, and state the purpose of your home visit.
- Confirm the patient's identity using at least two patient identifiers.<sup>16</sup>
- Ask the patient and family (if appropriate) about any recent changes in the patient's health status, including practitioner visits, tests, and changes in medications, fluid intake, diet, or activity level.<sup>9</sup>
- If your agency uses products that contain latex, verify that the patient doesn't have a latex allergy. If indicated, remove such products and use latex-free alternatives *to avoid an adverse reaction*.<sup>1 | 3 | 4 | 5 | 14</sup>
- If the testing requires fasting, verify that the patient has fasted. If the testing requires any other preparations (such as administering or holding medication), confirm the patient's adherence to these requirements.<sup>1 | 2 | 3</sup>
- Explain the procedure to the patient and family (if appropriate) according to their individual communication and learning needs *to increase their understanding, allay their fears, and enhance cooperation*.<sup>17 | 18 | 19 | 20</sup>
- Ask whether the patient has ever felt dizzy, faint, nauseated, or anxious when having blood drawn *to prepare to manage an adverse reaction in a patient at risk for such reactions*. Provide reassurance and emotional support, as appropriate.<sup>3 | 4</sup>
- Perform hand hygiene.<sup>5 | 21 | 22 | 23 | 24 | 25 | 26</sup>
- Organize the equipment and supplies on a clean surface. Place a fluid-impermeable pad between the environment and the equipment if necessary.<sup>22 | 27</sup>
- Assist the patient to a comfortable position (seated or recumbent), with the arms supported and extended down.<sup>1 | 3</sup>
- Make sure the lighting is adequate to provide clear visualization of the patient's veins.
- Perform hand hygiene.<sup>5 | 21 | 22 | 23 | 24 | 25 | 26</sup>
- Put on gloves and, as necessary, other personal protective equipment *to comply with standard precautions*.<sup>5 | 22 | 28 | 29 | 30 | 31</sup>
- Inspect and palpate the patient's veins *to determine the best venipuncture site*. (See [Common venipuncture sites](#).) Identify a vein that is prominent and straight (with a tubelike curvature) and feels spongy and resilient.<sup>4</sup> Avoid sites that are infected, scarred, bruised, or edematous.<sup>1 | 2 | 3 | 4</sup>

### COMMON VENIPUNCTURE SITES

The illustrations below show the anatomic locations of veins commonly used for venipuncture. The most commonly used veins include the median cubital, cephalic, and basilic veins in the antecubital area. When the antecubital veins are unacceptable or unavailable, use veins on the back of the hand if necessary. *Because of the risk of nerve, tendon, and arterial involvement*, don't use veins on the palmar surface of the wrist or the lateral wrist above the thumb to the mid-forearm.<sup>1</sup>



- Place a fluid-impermeable pad under the intended venipuncture site *to prevent soiling*.<sup>[4]</sup>
- Apply a single-use tourniquet proximal to the intended venipuncture site *to produce venous congestion*.<sup>[5]</sup> Make sure that you can palpate an arterial pulse distal to the tourniquet *to prevent circulatory impairment*. The tourniquet can be applied over clothing *to avoid pinching of the skin*. Alternatively, use a blood pressure cuff instead of a tourniquet *for patient comfort*.<sup>[1][3][4]</sup>

◆ **Clinical alert:** Limit tourniquet application time to less than 1 minute *to prevent hemoconcentration of the specimen*. If a tourniquet has been in place for longer than 1 minute before accessing the vein, release it and reapply it after 2 minutes. Then, perform the venipuncture.<sup>[1][2][5]</sup> ◆

◆ **Older adult alert:** A tourniquet isn't always necessary for venipuncture and may cause injury to patients with fragile skin or veins, such as older patients. Apply the tourniquet loosely or avoid tourniquet use altogether in such patients.<sup>2|3</sup>◆

- Prepare the intended venipuncture site using an antiseptic agent (preferably, alcohol-based chlorhexidine; if contraindicated, an iodophor [such as povidone-iodine] or 70% alcohol). Apply using a single-use sterile applicator. Allow solution to dry completely without fanning, wiping, or blowing.<sup>2|5|32</sup>
  - For alcohol-based chlorhexidine, apply with an applicator using a vigorous side-to-side motion for 30 seconds. Allow the area to dry completely.<sup>32|33</sup>
  - For povidone-iodine solution, apply using a swab. Begin at the intended insertion site and move outward in concentric circles. Allow the solution to dry completely (typically at least 2 minutes).<sup>32|34</sup>

◆ **Clinical alert:** Don't touch the intended venipuncture site after preparation. If you do touch the site, clean the site again.<sup>1|4|5</sup>◆

- Firmly hold the patient's arm distal to the intended venipuncture site. Immobilize the vein by pressing 1" to 2" (2.5 to 5 cm) below the venipuncture site with your thumb and drawing the skin taut.<sup>1|3|4</sup>
- Instruct the patient to close the hand in a fist *so the vein is more prominent*, but tell the patient *not to clench the fist tightly or to open and close the fist repeatedly to prevent pseudohyperkalemia*.<sup>1|2|3|4</sup>
- Position the needle holder or syringe with the needle bevel up and the shaft parallel to the path of the vein and at a 30-degree angle to the arm (shown below). If you're using a winged (butterfly) collection device, grasp the wings and position the needle bevel up.<sup>1|4</sup>



- Tell the patient that you're about to perform the venipuncture *to prepare the patient*.<sup>1</sup>
- Insert the needle into the vein. If you're using a syringe, watch for venous blood to appear in the hub. Withdraw the blood slowly, pulling the syringe plunger gently to create steady suction until you obtain the required sample. *Pulling the plunger too forcefully may collapse the vein*. If you're using a blood collection tube holder and a blood collection tube, grasp the tube holder securely to stabilize it in the vein and push down on the collection tube until the needle punctures the rubber stopper (shown below). Blood will flow into the tube automatically.<sup>1|3</sup>



- Release the tourniquet immediately, and instruct the patient to open the fist when blood begins to flow into the collection container.<sup>1 2 3 4</sup>
- If you're using a blood collection tube holder and a blood collection tube, remove the first tube from the holder once it fills to the correct volume and blood flow ceases. Continue to fill the required tubes using the correct order of draw, removing one and inserting the next. Then invert each tube gently the appropriate number of times *to mix the blood sample*. Once you've collected the required blood samples, remove the last tube from the needle holder before withdrawing the needle *to release the vacuum* (shown below).<sup>1 4</sup>



- Place a gauze pad over the venipuncture site, and remove the needle from the vein slowly and gently.<sup>1 3 4</sup>
- Activate the needle protector safety device immediately.<sup>1</sup>
- Instruct the patient to apply gentle pressure to the venipuncture site with the arm extended and raised until bleeding stops *to prevent extravasation into the surrounding tissue, which may cause a hematoma*.<sup>1 3 4</sup>
- If you obtained blood using a syringe, remove the covered needle from the syringe. Then transfer the blood into appropriate blood collection tubes using a needleless transfer device. Don't apply pressure to the plunger on the syringe; instead, let the tubes fill by vacuum. Continue to fill the required tubes using the correct order of draw, removing one and inserting the next. Then invert the tubes gently the appropriate number of times *to mix the blood samples*.<sup>1 4</sup>
- Discard syringes and needles in a puncture-resistant sharps disposal container.<sup>1 4 5 30 35 36</sup>
- Reassess the venipuncture site for bleeding and hematoma formation.
- After bleeding stops, apply an adhesive bandage to the venipuncture site.<sup>1 3 4</sup>
- Label the blood collection tubes in the presence of the patient *to prevent mislabeling*.<sup>5 16</sup> Include the patient's name, date and time of collection, and any other information required by the laboratory.

- Complete a laboratory requisition form, as appropriate.<sup>4</sup>
- Place the blood collection tubes in a laboratory biohazard transport bag.<sup>30</sup> If transport delays are possible, keep the blood samples cold by placing them in a refrigerator or in an insulated container with temperature control packs, as appropriate.<sup>2</sup>
- Discard used supplies in appropriate receptacles.<sup>5</sup> <sup>29</sup> <sup>30</sup> <sup>37</sup> <sup>38</sup>
- Remove and discard your gloves and other personal protective equipment you wore.<sup>30</sup>
- Perform hand hygiene.<sup>5</sup> <sup>21</sup> <sup>22</sup> <sup>23</sup> <sup>24</sup> <sup>25</sup> <sup>26</sup>
- Review progress toward the goals in the plan of care with the patient and family, as appropriate.<sup>9</sup> <sup>39</sup>
- If you know, tell the patient when to expect practitioner contact about the test results.
- Make arrangements for the next home visit, as appropriate, and ensure that the patient and family have adequate supplies for self-care until then.
- Provide and review written educational materials, the home visit schedule, and contact information if concerns arise between home visits.<sup>40</sup> <sup>41</sup> <sup>42</sup> <sup>43</sup>
- Report to the practitioner changes in the patient's condition and progress toward goals, as appropriate.<sup>44</sup> <sup>45</sup> <sup>46</sup> <sup>47</sup>
- When you finish your home visit, transport and deliver the blood samples to the laboratory within the required time, as directed by your agency and the receiving laboratory. (See the "[Laboratory specimen handling and transport, home care](#)" procedure.)
- Document the procedure.<sup>48</sup> <sup>49</sup> <sup>50</sup> <sup>51</sup> <sup>52</sup>

## ■ Special Considerations

- For coagulation studies, don't discard the initial sample unless you're using a winged (butterfly) needle with an attached extension set, *because air in the extension set prevents the correct ratio of blood to anticoagulant additive in the blood collection tube.*<sup>1</sup>
- If the patient experiences dizziness or faintness during or after the procedure, stop the procedure, remove the tourniquet and needle (as appropriate), assist the patient to the supine position or lower the patient's head, and provide instructions to take slow and deep breaths. If the patient loses consciousness, notify emergency medical services and the practitioner, as appropriate.<sup>3</sup> <sup>1</sup>
- Older patients and patients undergoing chemotherapy may have veins that are difficult to identify, roll or collapse easily, and are fragile or inelastic. To overcome these potential challenges, prewarm the intended venipuncture site, anchor the veins securely, and use low-volume blood collection tubes, small needles, and syringes with gentle pulling pressure.<sup>1</sup>
- Patients who are obese may have deep veins that are difficult to locate, and adipose tissue may mimic the feel of a vein. To overcome these potential challenges, prewarm the intended venipuncture site, apply a bariatric blood pressure cuff instead of a tourniquet, anchor the veins securely, and use longer needles. The use of a transillumination device, if available, can also be helpful.<sup>1</sup>

## ■ Complications

Complications of venipuncture include:

- accidental arterial puncture
- bleeding
- dizziness
- hematoma at the needle insertion site
- improper blood collection technique and specimen handling that lead to contamination, hemolysis, and hemoconcentration, resulting in—
  - erroneous laboratory values
  - clinical mismanagement.
- infection
- nausea
- nerve injury
- syncope



- vomiting.<sup>1</sup><sup>2</sup>

## ■ Documentation

Document the following for venipuncture:

- date and time the blood sample was drawn
- venipuncture site
- name of the test(s)
- blood volume withdrawn
- patient's tolerance of the procedure
- any adverse reactions that occurred
  - name of the practitioner notified
  - date and time of the notification
  - any prescribed interventions
  - patient's response to those interventions
- laboratory's information with the date and time of the blood sample delivery to the laboratory
- teaching provided to the patient and family (if applicable)
  - their understanding of that teaching
  - any need for follow-up teaching.

This procedure has been co-developed and reviewed by  
the National Association for Home Care & Hospice.



## ■ Related Procedures

- [Venipuncture](#)
- [Venipuncture, neonatal](#)
- [Venipuncture, pediatric](#)

## ■ References

([Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions](#))

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#### Rating System for the Hierarchy of Evidence for Intervention/Treatment Questions

The following leveling system is from *Evidence-Based Practice in Nursing and Healthcare: A Guide to Best Practice* (2<sup>nd</sup> ed.) by Bernadette Mazurek Melnyk and Ellen Fineout-Overholt.

Level I: Evidence from a systematic review or meta-analysis of all relevant randomized controlled trials (RCTs)

Level II: Evidence obtained from well-designed RCTs

Level III: Evidence obtained from well-designed controlled trials without randomization

Level IV: Evidence from well-designed case-control and cohort studies

Level V: Evidence from systematic reviews of descriptive and qualitative studies

Level VI: Evidence from single descriptive or qualitative studies

Level VII: Evidence from the opinion of authorities and/or reports of expert committees

*Modified from Guyatt, G. & Rennie, D. (2002). Users' Guides to the Medical Literature. Chicago, IL: American Medical Association; Harris, R.P., Hefland, M., Woolf, S.H., Lohr, K.N., Mulrow, C.D., Teutsch, S.M., et al. (2001). Current Methods of the U.S. Preventive Services Task Force: A Review of the Process. American Journal of Preventive Medicine, 20, 21-35.*

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