Training Behavioral Health Nurses in Phlebotomy to Improve Care for Patients with Serious and Persistent Mental Illness

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Abstract

People with serious and persistent mental illness (SPMI) are at higher risk for cardiovascular and metabolic abnormalities than the general population. Despite this, those with SPMI are less likely to have corresponding physiological markers, such as glycosylated hemoglobin (HbA1c) and lipids, recorded. Behavioral health nurses are well situated to bridge this gap and provide both mental and physical health support. Evidence suggests blood work collected by behavioral health nurses, rather than coordinating with an external facility, can reduce delays and costs of laboratory monitoring. Although within their scope of practice, a lack of training and organizational support has prevented behavioral health nurses performing phlebotomy. The purpose of this quality improvement project was to create and train behavioral health nurses working in a local community mental health clinic in phlebotomy. Using the Model for Improvement framework, this project was able to develop a video training on nurse-led phlebotomy using current best practices and deliver the training to behavioral health nurses. A post-training survey was administered after the training to measure knowledge acquisition and likelihood of using the skills in practice. Qualitative and quantitative analysis revealed that although video training improved knowledge, hands-on training was needed for nurses to confidently use these skills. Considerations for training behavioral health nurses on phlebotomy are discussed.

Training Behavioral Health Nurses in Phlebotomy to Improve Care for Patients with Serious and Persistent Mental Illness

Problem Description

Laboratory monitoring of psychiatric patients is a tool to evaluate a patient's general health, rule out medical or substance use issues that may be contributing to symptoms, monitor therapeutic serum levels and assess for potential side effects of certain psychiatric medications. Fragmented systems of care lead to delays in care for patients with serious and persistent mental illness (SPMI) who are taking antipsychotics and mood stabilizers that require routine laboratory monitoring. Delays in care have a negative effect on patient outcomes. Timely data is necessary for providers to make appropriate treatment decisions, safely adjust medications, quickly identify dangerous therapeutic drug levels and side effects, and correctly diagnose patients for appropriate treatment planning.

Care can be delayed with too many points of contact in a system. For example, a patient may need to see the psychiatric provider, behavioral health nurse, case manager, therapist, and phlebotomist, all of which require a separate appointment. Community mental health centers are well equipped to consolidate visits to minimize delays that may occur with separate patient contacts. Behavioral health nurses who regularly have contact with patients are particularly well-situated to minimize laboratory monitoring delays, yet their skills in phlebotomy tend to be underutilized. Oftentimes this is because organizations have not operationalized nurse-led phlebotomy nor provided adequate training to ensure nurses are confident in phlebotomy skills to provide this service to patients.

Available Knowledge

Antipsychotic medications can induce cardiovascular and metabolic dysfunction increasing risk for type 2 diabetes mellitus and cardiovascular disease (De Hert, Detraux, van Winkel, Yu, & Correll, 2011). Aside from metabolic monitoring, monitoring of therapeutic serum levels of certain psychiatric medications is recommended by various guidelines to avoid serious side effects, particularly mood

stabilizers used for bipolar disorder (American Psychiatric & Jacobson, 2012; Ng et al., 2009). Despite recommendations from the FDA, American Diabetes Association, and American Psychiatric Association, most patients receiving antipsychotic medications do not receive adequate testing for cardiovascular and metabolic abnormalities. Metabolic adverse effects of antipsychotic medications include weight gain, impaired glucose metabolism, and dyslipidemia. Cardiovascular adverse events include arterial hypertension, atherosclerosis, and sudden cardiac death (De Hert et al., 2011). These side effects are not uncommon. Among those who take antipsychotics, eighty percent will experience weight gain (Cunningham, Peters, & Mannix, 2013). Additionally, people with schizophrenia are 3-5 times higher to have obesity, type 2 diabetes, hypercholesterolemia and twice as likely to die of consequences of cardiovascular disease (Pillinger et al., 2020). Despite increased risk for cardiovascular disease, those with SPMI are 25 percent less likely to have their lipids and glycosylated hemoglobin (HbA1c) recorded than the general population despite more emergency department and primary care visits (Cunningham et al., 2013; Mitchell, Delaffon, Vancampfort, Correll, & De Hert, 2012)..

Chronic disease among those with SPMI is preventable and can be mediated by improved physical health care. Despite lower than adequate physical monitoring, behavioral health nurses rarely initiate venous blood sampling (Nash, 2011). Although mental health nurses believe they have not received adequate training to address physical health needs, they are interested in increasing the amount of training they receive to improve their awareness of physical health needs and provide holistic care (Cunningham et al., 2013; Happell, Scott, & Platania-Phung, 2012). Improved training for mental health nurses supports improved health outcomes for people with SPMI, as mental health nurses tend to have more contact with this population than other healthcare professionals and have the potential to advocate for their physical health needs. One aspect of improved training of physical health needs is with nurse phlebotomy training. Previous studies suggest that nurse-collected blood work instead of collection at an outside facility leads to a reduction in time between the written lab order and lab collection and reduces

cost (Hamm & Conley, 2019). More efficient and cost-effective lab collection ensures more timely medication monitoring and supports nurse involvement in a patient's physical health needs.

Rationale

The framework for this project is based on the Model for Improvement (Langley & Langley, 2009). This model outlines the following components: the aim, measures, and changes. The aim asks what the project is trying to accomplish. The measures define what will be examined to know whether a change was an improvement. The changes are what can be done that will result in an improvement. After those three components are defined, the Model for Improvement suggests completing a Plan-Do-Study-Act (PDSA) Cycle. PDSA cycles are small-scale cycles that test changes. This iterative approach supports data collection and reflecting on action to inform future changes.

This model was applied to improve the laboratory monitoring of patients with SPMI at a community mental health clinic with primary care integration. The clinic has considered using behavioral health nurses to streamline laboratory services. Although behavioral health nurses received phlebotomy education in nursing school, this is not a current part of their workflow and they need to be retrained to ensure competency. The clinic has attempted to implement a phlebotomy training for nurses in the past, but this has been delayed due to cost of training, availability of staff to champion the training, and training cancellations due to COVID-19.

Specific Aims

This project aimed to design and implement phlebotomy training for Behavioral Health Registered Nurses at the clinic to improve quality of care by decreasing delays in laboratory data.

Methods

Context

Currently at the clinic, patients with SPMI see the behavioral health nurses at regular intervals to get their medications. To get blood work done, an out of house laboratory service comes to the clinic once a week. Although behavioral health nurses attempt to schedule medication pick-ups and blood work on the same day, this is not always feasible because of nurse schedule capacity. Patients often are required to make multiple trips to the clinic to complete both medication pick-up and blood work. When patients decide to pick up medications and complete blood work on the same day, there are often long wait times because of the limited capacity of the out of house phlebotomist. Alternatively, labs are sometimes drawn in primary care. Although this is feasible, behavioral health patients are not always primary care patients and the two settings use different electronic health record (EHR) systems which necessitates extensive coordination by the psychiatric provider and/or behavioral health nurse to ensure the patient secures an appointment. Furthermore, blood work that is not collected in a timely manner can lead to poorer patient care including but is not limited to delays in identifying dangerous therapeutic drug levels, increasing medication to effective levels, and identifying serious medication side effects.

The phlebotomy training was for behavioral health nurses at the mental health outpatient clinics. The training was created in collaboration with the clinic's nursing leadership team and an intravenous access nurse at OHSU. There are four total outpatient clinics. The primary objective of the phlebotomy training was to decrease barriers for patients to receive phlebotomy services and therefore improve psychiatric care by increasing nurse competence and confidence in phlebotomy skills.

Interventions

There were three components of this intervention: (1) designing a workflow and protocol for behavioral health nurse-led phlebotomy, (2) creating training curriculum and materials, and (3) organizing and facilitating the training. Following the Model for Improvement, PDSA cycles were used to make

project adjustments as needed. In collaboration with an intravenous access nurse at OHSU, a video training on phlebotomy procedures and techniques was created. The original design of the project involved the completing an in-person training with primary care medical assistants following the video training. This would have involved shadowing the procedure and hands-on practice. This was not feasible given limited staff availability (see Limitations section).

Study of the Intervention

The primary goal of the intervention was to ensure nurses have the knowledge and skills to perform phlebotomy to decrease delays in laboratory monitoring and improve care. To measure the utility of the training, a short survey was administered after the training. The survey evaluated phlebotomy knowledge acquisition and likelihood of using the skills in practice.

Measures

The final product was the creation and implementation of the phlebotomy training. The impact of the training on nurse phlebotomy knowledge was evaluated using quantitative and qualitative data. Measures of training effectiveness were based on a post-training survey which included a Likert scale evaluating participant's subjective views of knowledge change before and after the training. These data were analyzed using a Wilcoxon signed-rank test with statistical analysis program SPSS. In addition, the post-training survey included open-ended questions about training effectiveness, clarity of content, ease of use, applicability to work, and suggestions to improve training. Free text responses were coded using a qualitative coding software called Taguette. This project was intended current and future use. Future work may be necessary to coordinate trainings and update training materials.

Ethical Considerations

Before implementation, this project was submitted to the International Review Board for approval. One ethical consideration was ensuring phlebotomy training was created and implemented by those considered highly competent or expert in the field. This was addressed by collaborating with an

intravenous access nurse with more than five years of experience who is currently enrolled in the Master of Education Program at OHSU School of Nursing. In addition, training materials were modeled after evidence-based texts on phlebotomy to ensure educational content was accurate and reflected current best practices.

Implementation of Project and Findings

PDSA Cycles

The project evolved throughout the implementation. Three total PSDA cycles were completed. They included (1) development of workflow and protocol in collaboration with stakeholders, (2) development of training and video production, and (3) delivery of training and survey.

For the first PDSA, a workflow was created outlining the steps involved for behavioral health nurses to draw blood for laboratory testing. This included who and where orders could be verified in the EHR system, the process for rooming patients, preparation of the work area, procedure steps, how to process the specimen, process to print test requisition, and ordering laboratory pick-up. Additionally, a protocol was created to define and standardize expectations and rationale for the procedure (See Appendix A). These two documents were presented for approval to behavioral health nursing management and directors over the course of four meetings and edited based on feedback. After the protocol and workflow were developed, the human resources department and nursing union were requested to review the nursing job description to ensure asking staff to perform phlebotomy was not in violation of the current contract. Both parties confirmed implementing nurse-led phlebotomy was not in violation of the current contract.

For the second PDSA, a training outline was developed, and video training was filmed and edited. This portion was in coordination with an OHSU intravenous access nurse who is also a current Master of Nursing Education Student. Training outline was developed using evidence-based best practices from online resources, instructional videos from a local community college, and textbooks on phlebotomy (See

Appendix B). Filming of training included video demonstration of phlebotomy techniques using different venipunctures sites and blood collection systems. The video incorporated therapeutic and trauma informed techniques. This included assessing patient for previous negative experiences with venipuncture, calming techniques, and use of numbing agents for venipuncture sites. The training was originally scheduled for filming in January 2021 but was delayed due to limited availability of staff. The primary care medical assistant, who is a certified phlebotomist, was originally scheduled to perform the venipuncture demonstration. Due to medical assistant shortage between two of the outpatient primary care clinics within the organization, availability of the medical assistant was limited thus delaying the filming process until late February. Footage was then edited and compiled into a 27-minute training video. Training video was reviewed and approved by behavioral health nursing management.

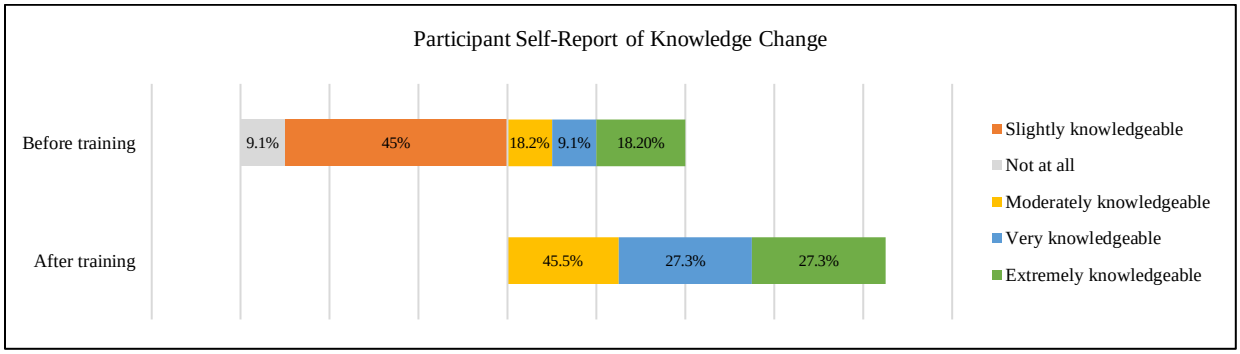
For the third PDSA, the training and survey was delivered to eligible and available nursing staff. Virtual training was presented to 11 behavioral health nurses during a monthly nursing meeting in April 2021. After watching the training video, staff were asked to complete an online post-training survey. The project originally intended to have both a virtual and in-person component for hands-on training. Due to limited staff availability, this was not possible during this project.

Results

A total of 11 behavioral health nurses participated in the training. A quantitative analysis was performed based on the Likert scale responses from the post-training survey which asked nurses rate their knowledge before and after the training on a five-point scale ("Not at all" to "Extremely knowledgeable"). Figure 1 illustrates the survey responses by percentage. A Wilcoxon signed-rank test showed that nurses reported a statistically significant increase in knowledge at the $p < 0.05$ level ($Z = -2.810$, $p = .005$). These results suggest that the training did increase nurse's subjective perception of knowledge of phlebotomy.

Figure 1

Survey responses of nurse knowledge before and after phlebotomy training by percentage



A qualitative analysis of open-ended survey questions was performed. The open-ended question asked to identify barriers to using these skills and how to improve the training. The common themes were 1) need for hands-on training (12 comments), 2) job-related time constraints limiting ability to use skill (2 comments), and 3) desire for supplemental handouts (2 comments). These results suggest that an in-person hands-on training component is essential for behavioral health nurses to feel comfortable using phlebotomy skills.

Discussion

Interpretation

Previous studies have shown that behavioral health nurses are interested in training to address physical needs of those with SPMI yet do not believe they receive adequate training to do so (Cunningham et al., 2013; Happell et al., 2012). Training behavioral health nurses on phlebotomy has various advantages including reduced time between written lab order and collection and reduced overall cost of obtaining lab work (Hamm & Conley, 2019). This project successfully developed a protocol, training outline, and video training on nurse-led phlebotomy and delivered the video training to behavioral health nurses at the clinic. The original design of the project included an in-person training component for hands-on practice of phlebotomy skills. Unfortunately, due to staffing limitations in the primary care department, this was not possible during this project. The absence of in-person training was

reflected in post-training survey responses. Although nurses reported their knowledge of phlebotomy increased after watching the video training, they still reported a need for additional in-person training. This indicates, while virtual training is a valuable tool to deliver phlebotomy fundamentals, an in-person component is still necessary for the skill to be operationalized among behavioral health nurses. Because all training components could be developed and delivered within the organization, costs were relatively low. The only monetary consideration was the cost of lost labor while nurses completed the training.

Limitations

The generalizability of this project is limited given the unique organizational structure of the clinic. The clinic is an integrated health center offering both behavioral health and primary care services. Providing phlebotomy training within an organization with integrated care has clear advantages. Because medical assistants in primary care perform phlebotomy as a part of their regular duties, behavioral health nurses can shadow and receive additional support to develop skills from within the organization. Non-integrated settings would otherwise need to either partner with another organization or pay for in-person training. Delivering phlebotomy training within an integrated setting substantially reduces costs, which otherwise might be prohibitory to community-based mental health centers with limited financial resources.

A limitation of this project was staff availability. As mentioned earlier, the original design of the training included an in-person component during which behavioral health nurses would shadow and practice phlebotomy skills with primary care medical assistants. Because of the shortage of medical assistants in the primary care, the in-person portion was not possible. According to primary care management, the organization has had difficulty hiring and retaining medical assistants. In the future, staff availability is an important consideration for projects using internal resources and staff for training.

An external factor that influenced this project was the COVID-19 pandemic. Social distancing requirements restricted the number of individuals that could gather in a space. In response to social

distancing requirements, the original project design included both a virtual and in-person component. The virtual component later became the video training created for this project. This ultimately was an asset to the organization because it ensured those trained in the future will receive consistent and standardized information based on evidence-based standards.

Conclusion

This project intended to develop and deliver phlebotomy training to behavioral health nurses. Due to staffing shortages, the behavioral health nurses were only able to complete the virtual portion of the training. Post-training survey data suggested that although the virtual training increased understanding of phlebotomy, an in-person hands-on component would have been necessary for skill acquisition. Next steps of the project require the organization to coordinate the in-person portion of the training with the primary care staff.

This project could be replicated in other community-based integrated health centers – particularly those noticing laboratory monitoring barriers for patients with SPMI. Notably, the project costs were low because the organization did not have to outsource the training. Because of this, the development and implementation of this project may not apply to non-integrated settings. Overall, this project reinforces that, with appropriate training and organizational resources, behavioral health nurses are uniquely situated to improve physical health monitoring of those with SPMI.

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Appendix A

Phlebotomy Protocol

BEHAVIORAL HEALTHCARE INTERNAL PHLEBOTOMY PROTOCOL

Definitions:

Laboratory Monitoring: Laboratory monitoring of psychiatric clients is a tool to assess the general health, rule out medical or substance use issues that may be contributing to symptoms, and ensure client physical status, particularly, liver and renal function is adequate for prescribed medication, and monitor serum levels and potential side effects of certain psychiatric medications.

Venipuncture: The puncture of a vein as part of a medical procedure to withdraw a sample of blood.

Vacutainer Tube Type: Tube for sample collection is specific to test ordered. A reference tables for tube types are listed below or can be viewed on the Quest Diagnostics Test Directory Website. Further blood collection instructions can be found here.

- **Lavender:** EDTA Additive
- **Tiger:** Serum Separator Tube (SST) with gel
- **Red:** No gel, serum
- **Whole blood:** Unspun, sent in vacutainer tube
- **Serum:** Spun.
    - Red tops are aliquoted, and serum is sent in separate transport tube.
    - Tiger top tubes do not need to be aliquoted, can be sent directly in vacutainer after spinning.

BH: Behavioral Healthcare

HgbA1c: Hemoglobin A1c

CBC: Complete Blood Count

CMP: Comprehensive Metabolic Panel

TSH: Thyroid Stimulating Hormone

Treatment Protocol Considerations:

A. **Indication:**
    i. **Metabolic Monitoring for Antipsychotics:** Antipsychotic medications can induce cardiovascular and metabolic dysfunction increasing risk for type 2 diabetes mellitus and cardiovascular disease (De Hert et al., 2011). Despite recommendations from the FDA, American Diabetes Association, and American Psychiatric Association, most clients receiving antipsychotic medications do not receive adequate testing for cardiovascular and metabolic abnormalities. See Appendix A for monitoring parameters.
    ii. **Serum Levels of Psychotropic Medication:** Safety monitoring of certain psychiatric medications is recommended by various guidelines to avoid serious side effects, particularly mood stabilizers used for bipolar disorder (American Psychiatric & Jacobson, 2012; Ng et al., 2009).
B. **Contraindications:** Contraindications for specific venipuncture sites include (1) a site on the arm of the side of a mastectomy or other lymphatic system compromise, (2) a side affected by

radiation, tissue injury, or infection, (3) a site on arm on the side affected by stroke, (4) a current or planned hemodialysis arteriovenous fistula site, (5) client declines to participate in lab work, (6) if known case of difficult lab draw, direct patient to external laboratory site. (Bokholdt, 2020).

C. **Precautions:** If client reports severe or unusual shooting pain, tingling, numbness, or tremor in the arm, these may be signs of nerve injury and needle should be withdrawn immediately (Bokholdt, 2020). Use standard precautions when handling blood or other potentially infectious material. Work areas with potentially contaminated material must be disinfected immediately with an appropriate disinfectant. In the event of exposure, follow Blood Borne Pathogens Training protocol. (Health and Safety Precautions via Quest Collection and Transport Guide).

Client Education and Informed Consent: Client understands risks and requirements for participating in treatment including but not limited to venipuncture.

Baseline Labs/Monitoring: LMP may orders the following labs be collected by BH nursing

Test	**Vacutainer Tube Stopper Color**	**Preferred Specimen (mL)**
HgbA1c and/or fasting plasma glucose	Lavender Top	1 mL whole blood
Fasting lipid panel	Tiger or Red	1 mL serum
CBC	Lavender Top	whole blood
TSH	Tiger or Red	1mL serum
CMP (includes BMP and LFTs)	Tiger or Red	1mL serum
Prolactin	Tiger or Red	1mL serum
Ferritin (iron deficiency in restless leg syndrome)	Tiger or Red	1mL serum
Urine drug screen (UDS)	Urine collection	Varies based on test type
Gamma Glutamyl Transferase (GGT)	Tiger or Red	1mL serum
Pregnancy test	Urine collection	Point of Care
Lithium serum level	Tiger or Red	2 mL serum
Valproic Acid serum level	Red-Top (no gel)	1 mL serum
Carbamazepine serum level	Red-Top (no gel)	1 mL serum
Clozapine serum level	Red-Top (no gel)	2 mL serum
Amitriptyline serum level	Red-Top (no gel)	3 mL serum
Imipramine serum level	Red-Top (no gel)	3 mL serum
Nortriptyline serum level	Red-Top (no gel)	3 mL serum
Desipramine serum level	Red-Top (no gel)	3 mL serum

Other health measurements to consider:

Guidelines for monitoring cardiovascular and metabolic abnormalities in clients prescribed antipsychotic medications suggest the following should be monitored (De Hert et al., 2011):

- Blood pressure
- Weight (Body Mass Index)
- Waist circumference
- Personal/family history
- Breath CO (PIPBHC)

Lab collection orders:

Lab orders will be conveyed by LMP to BH RN and found in Credible.

Documentation:

Procedure should be documented in Credible.

Follow-up:

Follow-up as directed by LMP.

Appendix B

Phlebotomy Training Outline

Phlebotomy Training Outline

1. Intro to Phlebotomy
2. Indications
3. Infection Prevention
4. Anatomy Review
5. Equipment and Supplies
6. Order of the Draw
7. Patient Prep and Therapeutic Interventions
8. Venipuncture Steps
9. Patient Complications
10. Troubleshooting Missed Venipunctures
11. Specimen Handling and Processing

Intro to Phlebotomy

- Phlebotomy is performed for diagnostic purposes and monitor prescribed treatment.
    - Laboratory monitoring of psychiatric clients is a tool to assess the general health, rule out medical or substance use issues that may be contributing to symptoms, and ensure client physical status, particularly, liver and renal function is adequate for prescribed medication, and monitor serum levels and potential side effects of certain psychiatric medications.
- This is accomplished through *venipuncture* which is the collection of blood by penetrating a vein with a needle and other blood collection tools.

Indications in Psychiatry

- Metabolic Monitoring for Antipsychotics: Antipsychotic medications can induce cardiovascular and metabolic dysfunction increasing risk for type 2 diabetes mellitus and cardiovascular disease.
    - Despite recommendations from the FDA, American Diabetes Association, and American Psychiatric Association, most clients receiving antipsychotic medications do not receive adequate testing for cardiovascular and metabolic abnormalities.
- Serum Levels of Psychotropic Medication: Safety monitoring of certain psychiatric medications is recommended by various guidelines to avoid serious side effects, particularly mood stabilizers used for bipolar disorder.

Infection Prevention

- Understanding of infection prevention is necessary to avoid infection and injury.
- Aseptic technique with blood collection includes:
    - Proper hand hygiene
    - Keeping supplies in easy reach during procedure
    - Opening equipment packaging as to avoid contamination
    - Prompt disposal of contaminated equipment
    - Prompt cleanup of infectious material
    - Wearing gloves and PPE when indicated

- *Hand Hygiene* is the most important means of infection prevention.
    - Hand hygiene should be performed…
        - Before and after patient contact
        - Between unrelated procedures on a patient (e.g. wound care and blood draw)
        - Before and after putting on gloves
        - Before leaving procedure space
        - Before and after restroom use
        - Whenever hands are visibly soiled or contaminated
    - Review CDC Guidelines on Hand Hygiene for Health Professionals
- Gloves
    - Worn when collecting or handling blood or other bodily fluid, handling contaminated items, and touching non-intact skin or mucous membranes.
- Blood-Borne Pathogens
    - Review Training and CDC Guidelines on Blood Borne Pathogens
- Needlestick Safety and Prevention
    - Needlestick or sharps injury: Remove object and wash site with soap and water for a minimum of 30 seconds.
    - Refer to Needlestick Policy

Anatomy Review

- The *antecubital (AC) veins*, veins anterior and below the bend of the elbow, are the first-choice location for venipuncture because several major arm veins are close to the surface. These are most commonly in either an H-shaped or M-shaped pattern.
    - H-Pattern Antecubital Veins
        - *Median cubital vein:* Center of the antecubital area. Preferred vein because it is larger and better anchored than others. It is least likely to injure nerves or brachial artery. The most medial, or inner, part of the vein should be avoided as it overlies the brachial artery and major nerves.
        - *Cephalic vein:* Lateral aspect of antecubital area. This is the second-choice vein because it is well-anchored but harder to palpate than the median cubital. Avoid lateral portions to prevent accidental injury to the lateral cutaneous nerve.
        - *Basilic vein:* Medial aspect of antecubital area. This is the last choice because it rolls more easily increasing likelihood of puncturing the median nerve, medial cutaneous nerve, or brachial artery. This site tends to be more painful and bruise more easily and should only be chosen if other sites are not suitable.
    - M-Pattern Antecubital Veins
        - *Median vein:* Near center of antecubital area. First-choice because it is well anchored, less painful, and not as close to major nerves or arteries. Attempting to locate one of these veins on either arm should be made before alternative ACs are considered.
        - *Median cephalic vein:* Lateral aspect of antecubital area. Second choice because it is accessible and mostly located away from major nerves or arteries. Lateral portions should be avoided to prevent accidental injury to the lateral cutaneous nerve.
        - *Median basilic vein:* Medial aspect of the antecubital area. Last choice because it is more painful and located near the medial nerve and anterior and posterior branches of the medial cutaneous nerve and brachial arteries.

- Other Arm and Hand Veins
    - Veins on the back of hand and wrist are acceptable for venipuncture. Veins on side of wrist above thumb can cause nerve injury and should not be used. Veins on underside of wrist are never acceptable to use.
- Leg, Ankle, and Foot Veins
    - Should not be used for venipuncture without provider permission due to risk for phlebitis or thrombosis.
- Inappropriate Sites
    - Arm on site of mastectomy
    - Edematous areas
    - Hematomas
    - Arm in which blood is being transfused
    - Scarred areas
    - Arms with fistulas or vascular grafts
    - Sites above an IV cannula

Equipment and Supplies

- Equipment and Supplies needed for venipuncture:
    - Blood-Drawing Station
    - Equipment Carrier: In outpatient settings a handheld phlebotomy carrier or tray is sufficient to hold equipment.
    - Gloves
    - Antiseptic: 70% isopropyl alcohol is most used for blood collection.
    - Gauze Pads: 2-by-2-inch gauze folded into fourths are used to hold pressure over site after blood collection.
    - Bandages: Coban or adhesive bandage.
    - Needle and sharps disposal container
    - Biohazard disposal
    - Biohazard bags for blood transport
    - Patient identification equipment: computer or hand-written labels
    - Tourniquet
    - Needles: Inspect needle prior to venipuncture to ensure needle is not bent or blunted. Proper needle selection to avoid vein damage (needle too large) or hemolyzation (needle to small). Needles used must have safety devices.
        - Multisample needles: Used for larger, easy to find veins.
        - Winged infusion (“butterfly”): Used for small or difficult veins (e.g. hand veins). During use, the “wings” are gripped with thumb and index finger to allow for shallow insertion angle used in small veins. 23-gauge is most commonly used.
    - Tube holder
    - Evacuated tubes: These fill with blood automatically because of negative pressure created in the manufacturing process. These tubes will not fill properly if vacuum is lost prematurely, usually due to improper storage, opening tube, dropping tube, or advancing the tube too far onto the needle before venipuncture, or if the needle bevel is partially out of skin during venipuncture.
    - Heat pack
    - *Optional:* Stress ball

- *Optional:* EMLA cream: Numbs venipuncture site. Requires standing order. Apply 2.5 grams over skin and let sit for at least 15 minutes. Best to apply to 2 sites.
- *Optional:* Vapocoolant (cold spray): For pain relief prior to venipuncture. Applied just before needle insertion.

Order of the Draw

- Order of the draw refers to the order that tubes are collected during a multi-tube draw. Although likely will only use red top and lavender EDTA tubes, order of draw is useful for reference.
- [INSERT IMAGE OF ORDER OF THE DRAW]

Patient Preparation and Therapeutic Interventions

- Needle Phobia
  - If patient endorses needle phobia, ensure the most experienced and skilled phlebotomist perform the procedure. To reduce pain, use therapeutic interventions such as applying ice pack, EMLA cream, or vapocoolant.

Venipuncture Steps

- The following steps outline the venipuncture procedure:
  - Step 1: *Review the test requisition.* Verify tests to be collected, time and date of collection, and diet or other special circumstances for blood collection. Requisition must include ordering provider, patient's first and last name, date of birth, type of test to be performed, date or timing of test, ICD-10 code, and test status (fasting, timed, etc.).
  - Step 2: *Prepare patient.* Direct patient to blood collection area and verify name and date of birth. Explain the planned procedure and purpose. Employ therapeutic interventions as indicated. Answer patient questions.
  - Step 3: *Verify diet restrictions and latex sensitivity.*
  - Step 4: *Sanitize hands and put on gloves.*
    - Some may prefer to don gloves after vein selection because they may feel it is easier to find veins without gloves.
  - Step 5: *Position patient and apply tourniquet.*
    - Seat patient in position where their arm is extended downward in a straight line from shoulder to wrist with no bend in the elbow. Preferably have the patient seated in a chair with arms in case of fainting.
    - Apply tourniquet 3 to 4 inches above the intended venipuncture site. (Tourniquet is used to restrict blood flow and make veins more prominent – too close to the site, veins may collapse as blood is removed. Too far, it may be ineffective).
      - If drawing from the hand, tourniquet should be applied proximal to the wrist bone. If veins can be palpated without tourniquet, tourniquet application can wait until site is cleaned and needle is ready to be inserted.
      - Tourniquet should be snug, but not uncomfortable. It should be flat around the arm, not rolled or twisted. If skin is sensitive, can apply tourniquet over clothing. Do not apply over open sore.
    - Grasp the tourniquet on either end and apply a small amount of tension.
    - Bring the two sides together and cross the left end over the right close to the patient's arm.

        - Tuck a portion of the left side under the right side and pull it into a loop. Tourniquet ends should be pointing toward the patient's shoulder.
        - As the patient to make a fist, but not pump.
            - Pumping can distort lab values and movement may make it harder to find veins.
    - Step 6: *Select vein and release tourniquet*
        - Examine the median aspect of both arms for veins (this area must be examined prior to other areas, as this area has the least likelihood for nerve damage). Generally, patients have more prominent veins in their dominant arm.
        - Palpate the vein by pushing down on the skin with the tip of the index finger. Once the vein is found, roll your finger from one side to the other to judge size. A patent (open) vein is bouncy and has a tube-like feel. Do not elect a hard or cord-like vein, as this is likely sclerosed or thrombosed. Never select a vein near a pulse, as this could lease to inadvertent puncture of an artery. Wiping a site with alcohol can help make surface veins more visible, but does not substitute for cleansing the site.
        - [TIPS FOR VEIN SELECTION IF DIFFICULT TO FIND] If suitable vein in AC cannot be found in either arm, check backs of hands or wrist. If no vein is still not found, you can attempt to gently massage the arm, have the patient hang their arm at their side for gravity to encourage engorgement, or warm the arm with a warm compress.
        - Once selected, either note the location mentally or use an alcohol pad corner to mark the site.
        - If tourniquet was applied during selection, release it and ask patient to open fist.
    - Step 7: *Clean and air-dry site ("dry time is kill time").* Cleanse areas approximately 2-3 inches in diameter around and on selected site. Allow area to dry completely, as the drying process helps destroy microbes. Do not speed up the drying process by fanning or dabbing or touch the site after cleansing.
    - Step 8: *Prepare equipment.*
        - Assemble the blood collection system components. Select appropriately sized needle based on vein size and location. Attach needle to tube holder. Either place tube in holder or wait until needle is inserted. Select tubes according to ordered tests.
        - Ensure all equipment is not expired and sterility intact (packages sealed).
        - Place equipment and supplies, including gauze and alcohol pads, within easy reach.
    - Step 9: *Reapply tourniquet and inspect needle.*
        - Reapply the tourniquet. Pick up tube holder with your dominant hand. Uncap needle and inspect for defects.
            - If using a butterfly needle, hold winged portion of the butterfly between your thumb and index finger grasping them together. Cradle tubing in palm on dominant hand (aka hand holding wings) or place it next to patient's hand.
    - Step 10: *Ask patient to make fist, anchor vein, and insert needle.*
        - To anchor vein by grasping the patient's arm with your free hand using fingers on the back of the arm to support. Place your thumb 1-2 inches below intended

venipuncture site. This helps keep skin taut, prevents rolling, and makes needle insertion less painful.
    - With needle bevel pointing upwards, position needle above vein so it parallels vein path.
    - Warn patient that there will be a little poke.
    - For AC venipuncture, insert needle at 30-degree angle or less. Insertion motion should be a smooth steady forward motion.
    - For hand venipuncture, insert at a 10-degree angle or less. A "flash" or small amount of blood will enter tubing when inside the vein. "Seat" the needle by inserting it a bit further in the vein lumen to ensure needle does not come out if let go of. Note: blood does not flow until tube is in-place.
    - Whatever positioning you choose, hold needle steady so there is minimal movement.
- Step 11: *Establish blood flow, release tourniquet.*
    - Place collection tube in tube holder completely so the stopper is penetrated. This is done by pushing the tube with your thumb while holding the tube holder with your middle and index finder.
    - If in vein, blood will flow back in the tube.
    - If flow is established, release tourniquet and ask patient to release fist. If veins are delicate of difficult to draw on, particularly older adults, release of tourniquet may stop flow and is sometimes left during the duration of collection. Do not leave the tourniquet on for more than 1 minute.
- Step 12: *Fill, remove, and mix tubes in order of the draw.*
    - Fill tubes until the vacuum is exhausted and blood no longer flows into tube.
    - Tubes should be inverted gently 3-8 times.
    - Remove all tubes prior to needle removal to prevent blood spillage and needle sticks.
    - Before needle removal, remove tourniquet if still applied.
- Step 13: *Place gauze, remove needle, activate safety feature, and apply pressure.*
    - After tubes and tourniquet is removed, lightly hold clean gauze over insertion site. Do not press down on gauze while needle is inserted.
    - Remove needle and engage safety feature.
    - Ask patient to hold gauze and **dispose of needle immediately.**
    - While arm is still extended, apply pressure to gauzed site to prevent hematoma.
- Step 14: *Discard collection unit.*
    - Needle and holder should be discarded into sharps container immediately upon withdrawal to prevent needle stick injury.
- Step 15: *Label tubes.*
    - Tubes should be labeled in presence of patient. Labels should include the following:
        - Patient first and last names
        - Date of birth
        - Date/time of collection
        - Collector's initials
        - Any pertinent information such as "fasting"
- Step 16: *Observe special handling instructions.* For example, if specimen should be light protected, wrap in foil.

- Step 17: *Check patient's arm and apply bandage.* Ensure bleeding has stopped and apply adhesive bandage or Coban. Instruct patient to leave bandage for at least 15 minutes, then remove to avoid irritation. Instruct them to refrain from strenuous activity for at least 1 hour.
- Step 18: *Dispose of contaminated material.* Discard all remaining materials in trash or biohazard bin, depending on level of contamination.
- Step 19: *Thank patient, remove gloves, and sanitize hands.*
- Step 20: *Transport specimen to appropriate specimen processing area.*

Patient Complications

- Excessive Bleeding
  - Maintain pressure over venipuncture site until bleeding stops.
  - If bleeding persists after 5 minutes, contact appropriate personnel for support.
- Fainting
  - If patient feels faint during procedure:
    - Release the tourniquet and dispose needle
    - Apply pressure on the venipuncture site and lower patient head and instruct them to take deep breaths
    - Talk to the patient
    - Help position them safely in case of fall
    - Apply cold compress to forehead/neck
    - Stay with patient until recovered
- Nausea/Vomiting
  - Do not perform venipuncture if patient feels nauseous
  - Provide with emesis basin, cold compress
- Pain
  - A small amount of pain is normal with procedure
  - Extreme pain, numbness, burning/electric shock, radiating pain indicated nerve involvement and requires immediate needle removal.
  - If pain persists after needle removal, notify appropriate personnel.
  - Apply ice pack to reduce inflammation.
- Petechia
  - Small, non-raised red, purple, or brown colored spots that may appear after tourniquet is applied.
  - Does not indicate venipuncture error but may be an indicator that they may bleed excessively.
- Seizures/Convulsions
  - Known to happen during venipuncture, but no evidence that they are caused by it.
  - If this occurs, discontinue draw, hold pressure over site without restricting movement, call for help while easing patient to floor on their side to keep airway clear. Protect patient from self-injury, do not place anything in patient's mouth.

Troubleshooting Missed Venipunctures

- Needle Position
  - When inserted correctly, needle bevel is pointed upwards.
  - Other needle issues:

        - Needle not inserted far enough
        - Bevel partially out of skin
            - No blood and tube will not fill because vacuum will be lost
            - Remove tube and insert needle further before placing new tube
        - Bevel partially penetrated through the lower wall of vein
            - Needle inserted too deeply, too quickly, or angle too steep
            - If not corrected, can cause hematoma
            - Slowly pull needle back until normal blood flow established
        - Bevel through vein
            - Needle inserted at angle too steep or when needle is not held steady when tube is pushed onto it
            - Hematoma possible
            - Slowly pull needle back until normal blood flow established
        - Bevel against A Vein Wall
            - Incorrect needle angle (too shallow)
        - Bevel in Valve
        - Needle Beside Vein
            - Occurs when vein "rolls"
            - Withdraw needle until just under the skin, anchor vein securely, and redirect needle into vein
- Tube Position
    - Ensure tube is properly seated in tube holder and needle has penetrated the tube stopper.
- Collapsed Vein
    - Occurs even with correct needle position
    - Can indicate vacuum of tube is too much vein, tourniquet too tight or close to venipuncture site
- Tube Vacuum
    - Vacuum can be lost if bevel not completely under skin, can be lost during shipping and handling, or when punctured prior to venipuncture
    - If no blood flow and needle repositioning ineffective, try using a new tube