Specimen Collection – Complications

I. Collecting and Processing of Specimens
   A. Blood
      1. Venipuncture Complications

Preanalytical variables –
   Diet, posture, stress, alcohol, caffeine, smoking, exercise, time of day, and meds can all affect test results.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Affected Tests/Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetaminophen, some antibiotics</td>
<td>Elevated liver enzymes, bilirubin</td>
</tr>
<tr>
<td>Cholesterol-lowering drugs</td>
<td>Prolonged PT, APTT</td>
</tr>
<tr>
<td>Certain antibiotics</td>
<td>Elevated BUN, creatinine, electrolyte imbalance</td>
</tr>
<tr>
<td>Corticosteroids, estrogen diuretics</td>
<td>Elevated amylase, lipase</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Increased Ca, glucose, uric acid</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Decreased RBCs, Wcs, and platelets</td>
</tr>
<tr>
<td>Aspirin, salicylates, herbal supplements</td>
<td>Prolonged PT and bleeding time</td>
</tr>
<tr>
<td>Radiographic contrast dyes</td>
<td>Routine urinalysis</td>
</tr>
<tr>
<td>Fluorescein dye</td>
<td>Increased creatinine, cortisol, digoxin</td>
</tr>
</tbody>
</table>

Site Selection –
   May need to use wrist, back of hand. The skin in tougher here, and the veins are smaller, so use smaller gauge needles.
   Do not use legs or feet veins, unless approved by physician.

a. Vasoconstriction

   Causes
   - Hypothermia
   - Stress
   - Pain
   - Hyperventilation
   Warm site if possible, increases blood flow 7 times.

b. Fainting (syncope) or seizures

   Remove needle, tourniquet, and apply pressure.
   Contact nursing station for help.
Do not leave patient.
Fainting – lower head, cold compresses in head/back of neck.
Seizures – restrain patient to prevent injury.

c. Petechiae

Caution – excessive bleeding.
Apply additional pressure when done, as it may indicate bleeding disorder.

d. Edema

Fluid accumulation.
Avoid swollen areas. Sample will be contaminated with excess tissue fluid.

e. Hematoma

If drawing near hematoma, specimen will be contaminated with old, hemolyzed blood. (Or can draw below hematoma.)

Sometimes caused by:
- decrease in elasticity of the vein walls in older patient
- failure to remove tourniquet first before removing needle
- applying inadequate pressure to the site after removing needle
- bending arm while applying pressure
- excessive probing to obtain blood
- failure to insert needle far enough into vein
- inserting needle through vein

If hematoma begins to form, immediately withdraw the needle and apply pressure to the site.

f. Obesity

Avoid excessive probing.
Could see:
- hemolysis of RBCs
- increased concentration of intracellular elements – tourniquet on too long
- increased coagulation factors
g. **IV Therapy**

Never draw above IV site.

Draw –
- using opposite arm if possible
- below IV
- from different vein

**Hemoconcentration**

Diluted specimen

If blood is collected from IV needle, have nurse turn off IV, wait 2 minutes. Discard first 5 mL of blood, then switch and use new syringe for the actual specimen. If coag test are ordered, discard an additional 5 mL blood (IV lines are frequently flushed with heparin to prevent clotting). If blood is collected from arm with IV, this must be noted on requisitions (or in computer, when draw is verified).

h. **Damaged, Sclerosed, or Occluded Veins**

MUST BE AVOIDED!

Avoid hard blocked sites, may have impaired/blocked circulation.

i. **Hemoconcentration**

Tourniquet application – on too long.

Also due to excessive:
- Massaging
- Squeezing
- Probing

j. **Hemolysis**

May occur when:
- Using small gauge needle
- Pulling plunger of syringe too quickly
- Expelling blood into tube – excessive force
- Shaking tube – use gentle mixing
- Possibly contaminating with alcohol
### Laboratory Tests Affected by Hemolysis

<table>
<thead>
<tr>
<th>Seriously AFFECTED</th>
<th>Noticeably AFFECTED</th>
<th>Slightly AFFECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>K (potassium)</td>
<td>Fe (Iron)</td>
<td>P (phosphorus)</td>
</tr>
<tr>
<td>LD (Lactate</td>
<td>ALT (Alanine</td>
<td>TP (Total protein)</td>
</tr>
<tr>
<td>dehydrogenase)</td>
<td>aminotransferase)</td>
<td>Alb (albumin)</td>
</tr>
<tr>
<td>AST (Aspartate</td>
<td>T4 (Thyroxine)</td>
<td>Mg (Magnesium)</td>
</tr>
<tr>
<td>aminotransferase)</td>
<td></td>
<td>Ca (Calcium)</td>
</tr>
<tr>
<td>CBC (Complete blood count)</td>
<td></td>
<td>ACP (Acid phosphatase)</td>
</tr>
</tbody>
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**k. Collapsed Veins**

Syringe plunger is pulled back too quickly  
Small veins  
Excessive vacuum – too large of a vacutainer tube, such as when using vacuum tubes directly on back of hand vein

**l. Allergies**

Latex – use latex free tourniquet and gloves  
Iodine – use green soap and/or alcohol  
Alcohol – use iodine or green soap

**m. Thrombosis**

Vein blockage

**n. Burns/Scarred Areas**

**MUST BE AVOIDED** – very sensitive and painful  
(Baby with bad burns, was drawn by dermal puncture from ear lobe)

**o. Coordination of Blood Draw**

Avoid multiple “sticks” – if not necessary  
Excessive volume – infants  
Never stick when patient is receiving blood transfusion

**p. Children/Infants**

Small veins Delicate  
Small work area Crying
Uncooperative Stress
Parents

g. Mastectomy Patients

Avoid side of mastectomy – can cause lymphostasis
Double mastectomy – use fingers or back of hand

r. Psychiatric Patients

Leave phlebotomy tray at nurse’s station
Dispose of ALL equipment at nurse’s station
Ask for assistance if necessary

s. Stroke/Paralysis/Uncontrolled Muscles

Patients that are unable to control muscles or have frequent spasms present a real challenge to the phlebotomist.
Get help to hold patient’s arm steady.

t. Dialysis Patients

These patients have frequent blood draws and will usually have a cannula inserted for venous blood. Blood drawn from cannula is only done by specially trained personnel.

Fistulas are artificial shunts that surgically fuse an artery and a vein. This is a permanent connection tube in the arm of these patients, and this arm should be avoided when drawing blood.

Applying tourniquet to areas with fistulas or cannulas can compromise patient. Accidental puncture of area around the fistula can cause prolonged bleeding.

u. CVADs (Central Venous Access Devices)

Must be performed by specially trained personnel
4 types – Non-tunneled
Tunneled
Implanted Portacaths
Peripherally inserted central catheters (PICCs)