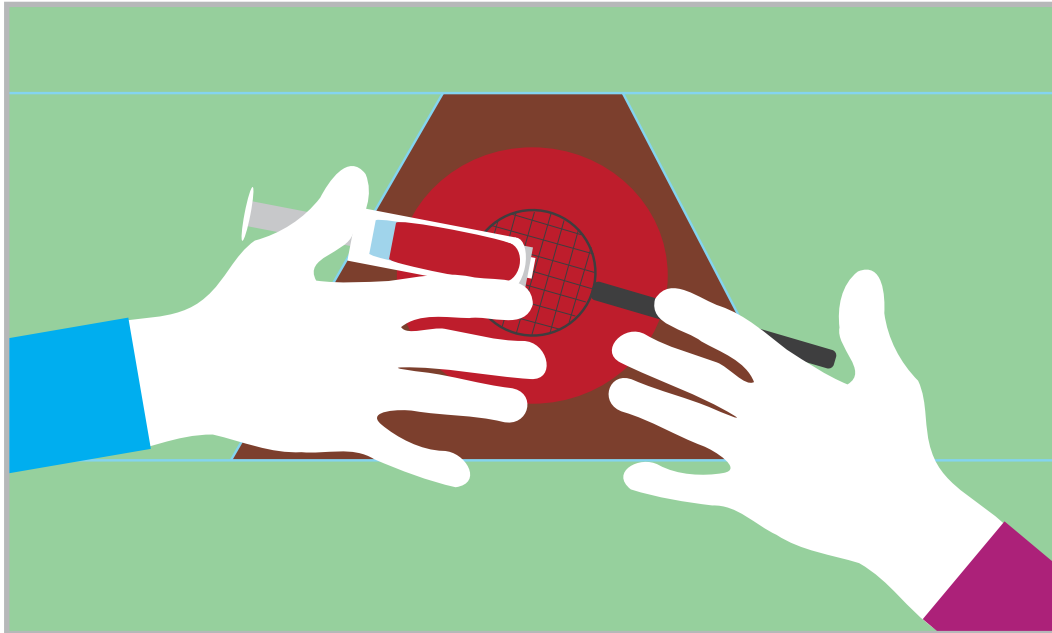


# Emergency Autotransfusion to Treat Hemoabdomen in the High-Quality, High-Volume Spay/Neuter (HQHVSN) Clinic Setting



The ASPCA Spay/Neuter Alliance has created these step-by-step guidelines to use in case of emergency hemoabdomen.

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## Chapter 1:

# Use & Risks

**Autotransfusion is a lifesaving, cost-effective practice.** It uses the patient's own blood and reduces the risk for transfusion reactions in an emergency setting. However, autotransfusions should only be performed when there is no evidence of contamination (such as urine, bile, bacteria) or neoplasia. In the HQHVS setting it is used solely to counteract complications of a post-operative hemoabdomen in preparation for abdominal re-entry.

## Using Fresh Blood

**Fresh untreated blood should not be used.** If the patient continues to bleed large volumes during surgery, you may not transfuse this fresh blood unless you are using anticoagulant in your collection syringes. If collected without anticoagulant, fresh blood will clot in the syringe. These large clots would quickly clog a HemoNate filter or a blood administration set. The only way fresh blood can be collected without anticoagulant is if it is allowed to clot (at least one hour to be sure it is defibrinated) and then collected through some type of strainer to remove large clots. Given the life-threatening nature of massive abdominal hemorrhage, waiting for blood to clot is rarely considered.

## Using Anticoagulated Blood

**Use care to flush all IV tubing using ONLY 0.9% saline.** Any blood product collected with anticoagulant must not mix with fluids containing calcium. Anticoagulants work by binding calcium, which is needed for the clotting cascade. If there is IV fluid present that contains calcium (LRS, Plasmalyte, etc.), the clotting cascade could be initiated, and the product may clot. Hypotonic solutions should also be avoided as they can cause red cell lysis. Again, use care to flush all IV tubing using ONLY 0.9% saline.

## Risks of Autotransfusion

1. Sepsis
2. Clogged filters (due to incompletely anti-coagulated transfusion or due to coagulated blood)
3. Hemolyzed blood
4. Hypocalcemia
5. Embolism
6. Coagulopathy

## Gentle Pressure

**Always use only gentle pressure** when transferring or administering blood, to minimize red blood cell trauma.

## Chapter 2:

# Autotransfusion Protocols

Some autotransfusion protocols indicate the use of anticoagulant is optional. However, in the case of acute hemoabdomen, there is a good chance that the blood collected is not completely defibrinated. To increase the chances of a clot-free collection and transfusion, the use of anticoagulant is recommended.

## Anticoagulant Dose

### 1 mL CPD, CPDA1, or ACD per 9 mL blood

- For 10.7 mL blood, use 1.3 mLs anticoagulant per 12 mL syringe
- For 53.4 mL blood, use 6.6 mLs anticoagulant per full 60 mL syringe

Syringe Size (mLs)	Amount of CPD, CPDA1 or ACD Added (mLs)
12	1.3
20	2.2
35	3.9
60	6.6

## Heparin Dose

Heparin can be used, though it is less desirable and cannot be stored. However, if necessary, recommended doses range from 5 units to 12.5 units per mL of blood. With this dose range, and using Heparin concentration 1,000 USP per mL, use:

- 0.06-0.15 mL heparin per 12 mL syringe of blood
- 0.3-0.75 mL heparin per 60 mL syringe of blood

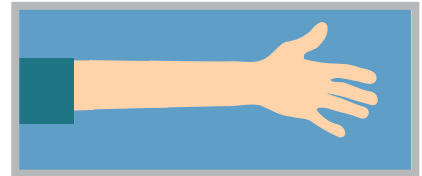
Syringe Size (mLs)	Amount of Heparin (mLs)
12	0.06-0.15
20	0.1-0.25
35	0.17-0.43
60	0.3-0.75

## Abbreviation Key

Having two support staff members makes it easier for the surgeon to focus on the patient and the source of the bleeding.

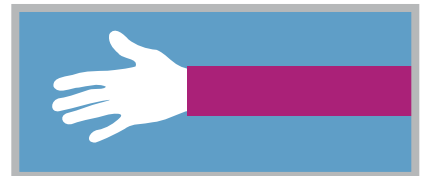
### TA = Transfusion Assistant

Opens supplies for surgical staff and performs other nonsterile procedures, while ensuring that the blood remains sterile.



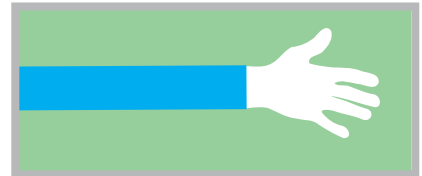
### SA = Surgical Assistant

Gloved and remains sterile, helping to assemble supplies and provide assistance to the surgeon, as needed.



### VS = Veterinary Surgeon

Gloved and remains sterile throughout the procedure, working to collect free blood and find and stop the source of the bleeding.



## Chapter 3: Supply List (quantities dependent on event)



Anticoagulant  
(CPD, CPDA1, ACD,  
or heparin)



Blood administration  
sets with incorporated  
blood filter (for large  
patients)



450 mL blood  
collection bag



60 mL syringes  
(for medium & large  
patients)



12 mL syringes



18 g needles



T-connector extension



Fluid administration  
sets



Extension set



3-way stopcock



Sterile tea strainers or  
sterile drain baskets



250 ml bottle sterile  
0.9% saline



IV pole



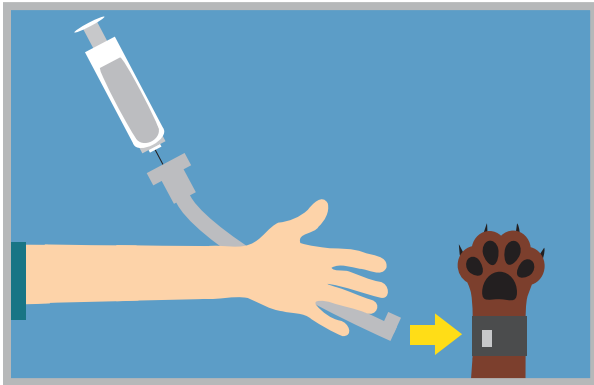
HemoNate filters (for small & medium patients).

Note: HemoNate filters are designated for administration of 50 mLs of blood prior to changing.

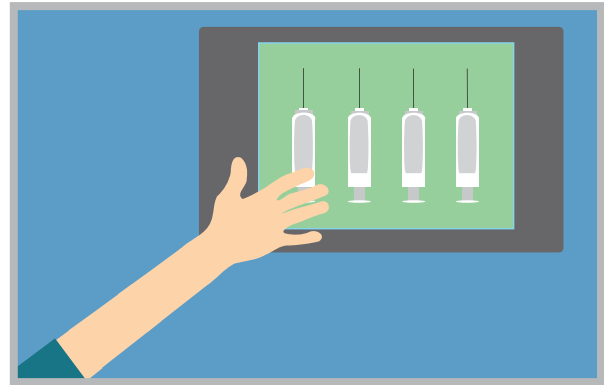
## Chapter 4: Cats/Small Dogs (<20 lbs/9 kg)

### Anticipated collection of <60 mLs of blood

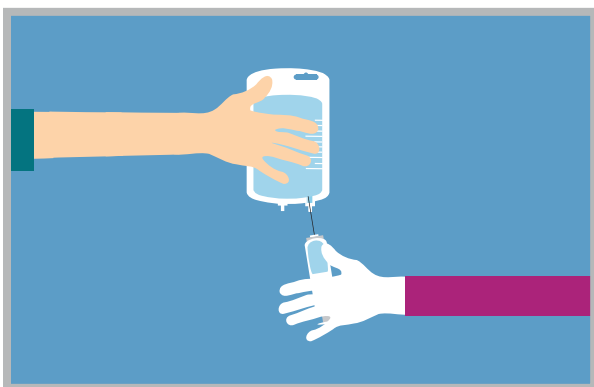
Always use ONLY GENTLE PRESSURE with blood to minimize red blood cell trauma



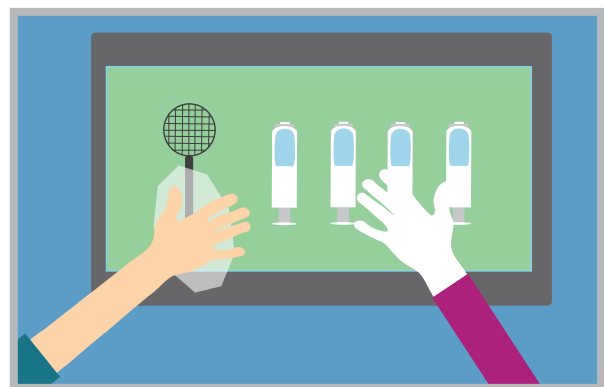
1. **TA** prepares patient for transfusion by securely attaching a pre-flushed (with 0.9% saline) T-connector to the catheter.



2. **TA** fills several 12 mL syringes with 0.9% saline & sets them aside for future flushing.

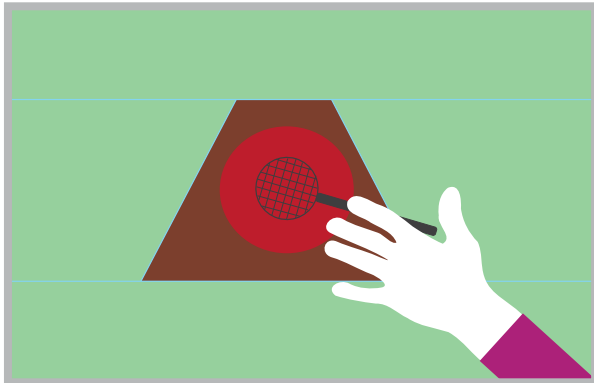


3. **TA** sterilely opens several 12 mL syringes & several 18 g needles. **SA** attaches the 18 g needles to the syringes, & sterilely draws anticoagulant into each one (see Chap. 2 for volumes).

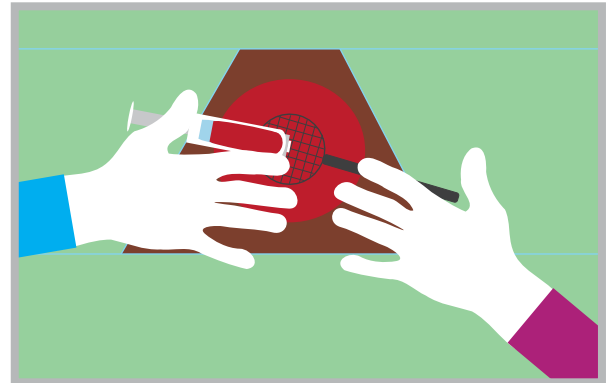


4. When filled, **SA** removes the needles from the syringes & sets them aside, ready for the **VS**. **TA** sterilely opens strainer for **SA**.

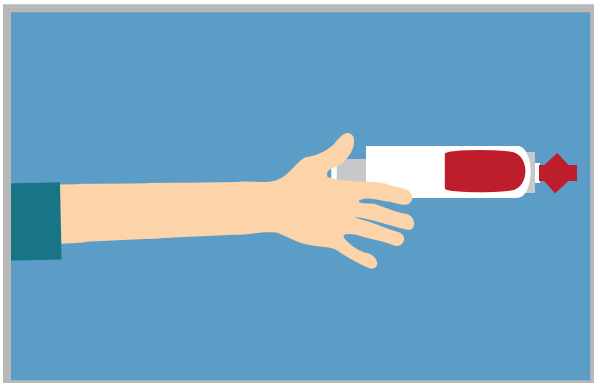
## Small Patients (Continued)



5. Upon entry into hemoabdomen, **VS/SA** places sterile strainer into pooled blood to hold back organs & large clots.



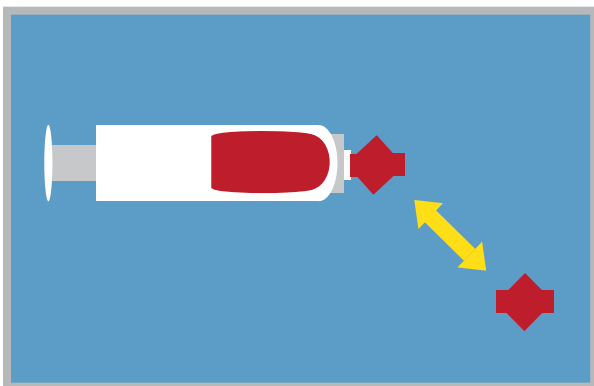
6. **VS** **gently** draws liquid blood from the center of the strainer into the anticoagulant-containing syringe(s).



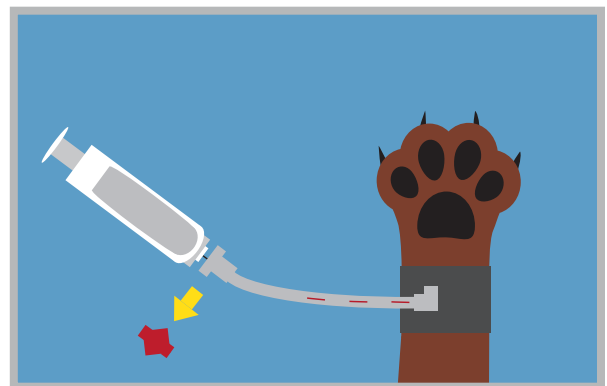
7. **SA** hands blood-filled syringe(s) to **TA**, who then attaches a HemoNate filter to one. Using **gentle** pressure, **TA** fills the filter with blood.



8. **TA** attaches the syringe to the T-connector, and using **gentle** pressure, pushes blood through the filter, T-connector, & into the patient. **TA** repeats with all blood-filled syringes.



9. As the transfusion proceeds, if it seems like increased pressure is needed to move the blood through the filter, it may have become clogged with clotted blood. If so, **TA** replaces with a new HemoNate filter.



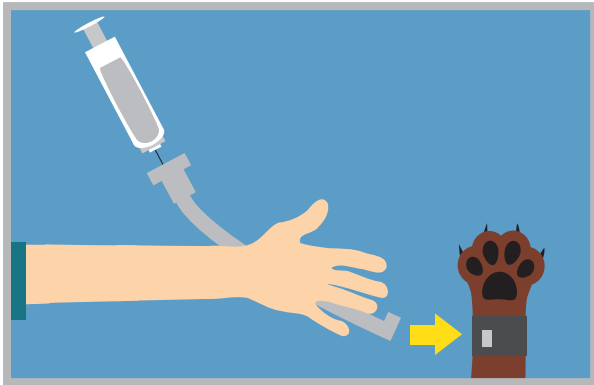
10. When the last syringe(s) is empty, **TA** removes & discards HemoNate filter, & **gently** flushes the line with one or more of the pre-prepared saline syringes, to push all the blood into the patient.



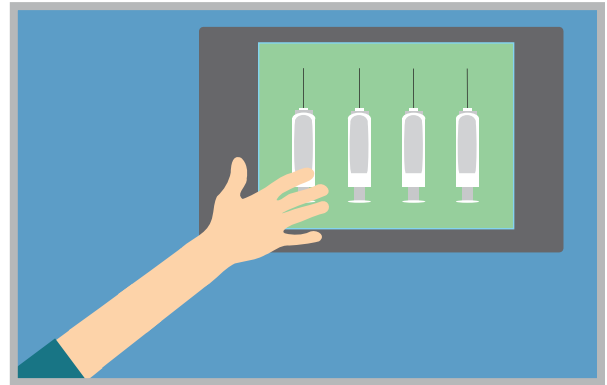
## Chapter 5: Medium Patients (20-50 lbs/9-22 kg)

Anticipated collection of 180-240 mLs (2-4 60 mL syringes) of blood

Always use ONLY GENTLE PRESSURE with blood to minimize red blood cell trauma



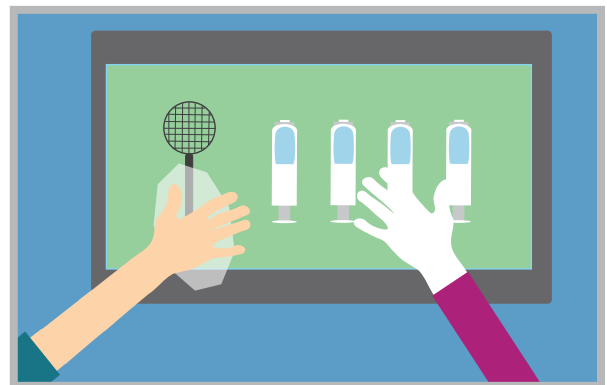
1. **TA** prepares patient for transfusion by securely attaching a T-connector (pre-flushed with 0.9% saline) to the catheter.



2. **TA** fills several 12 mL syringes with 0.9% saline & sets them aside for future flushing.

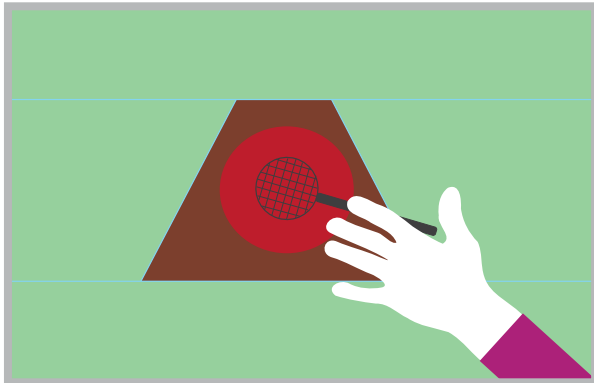


3. **TA** sterilely opens several 60 mL syringes & several 18 g needles. **SA** attaches the 18 g needles to the syringes, & sterilely draws anticoagulant into each one (see Chap. 2 for volumes).

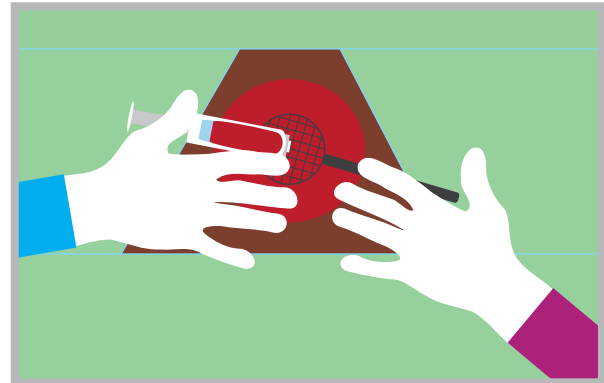


4. When filled, **SA** removes the needles from the syringes & sets them aside, ready for the **VS**. **TA** sterilely opens strainer for **SA**.

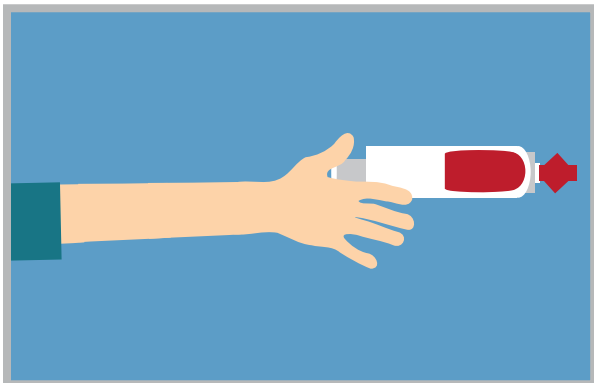
## Medium Patients (Continued)



5. Upon entry into hemoabdomen, **VS/SA** places sterile strainer into pooled blood to hold back organs & large clots.



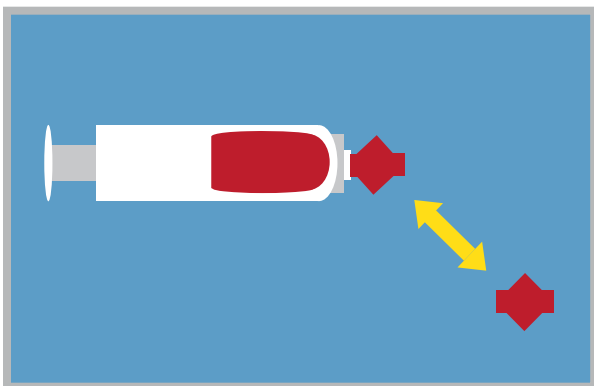
6. **VS gently** draws liquid blood from the center of the strainer into the anticoagulant-containing syringe(s).



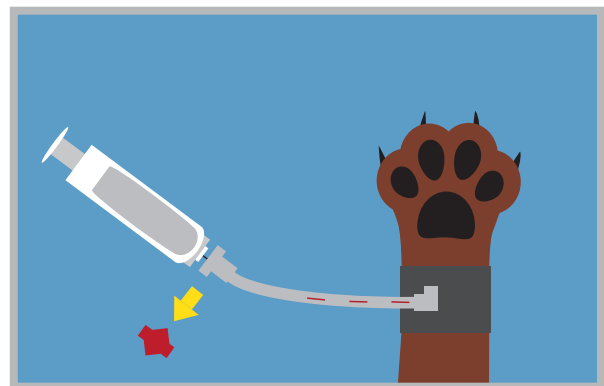
7. **SA** hands blood-filled syringe(s) to **TA**, who then attaches a HemoNate filter to one. Using **gentle** pressure, **TA** fills the filter with blood.



8. **TA** attaches the syringe to the T-connector, and using **gentle** pressure, pushes blood through the filter, T-connector, & into the patient. **TA** repeats with all blood-filled syringes.



9. As the transfusion proceeds, if it seems like increased pressure is needed to move the blood through the filter, it may have become clogged with clotted blood. If so, **TA** replaces with a new HemoNate filter.



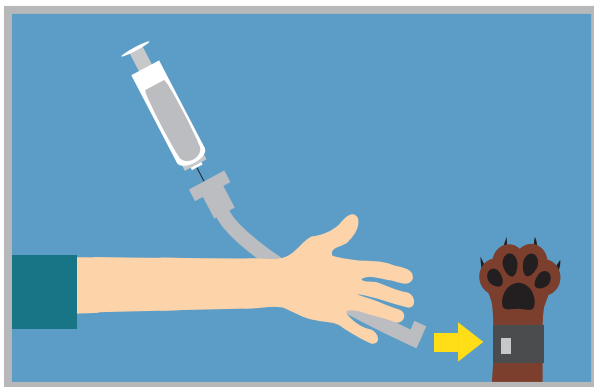
10. When the last syringe(s) is empty, **TA** removes & discards HemoNate filter, & **gently** flushes the line with one or more of the pre-prepared saline syringes, to push all the blood into the patient.

## Chapter 6:

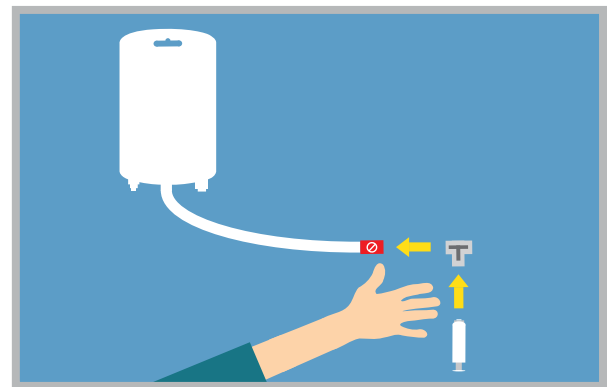
# Large Patients (>50 lbs/23 kg)

## Anticipated collection of 300-450 mLs of blood

Always use ONLY GENTLE PRESSURE with blood to minimize red blood cell trauma



1. **TA** prepares patient for transfusion by securely attaching a T-connector (pre-flushed with 0.9% saline) to the patient's intravenous catheter.

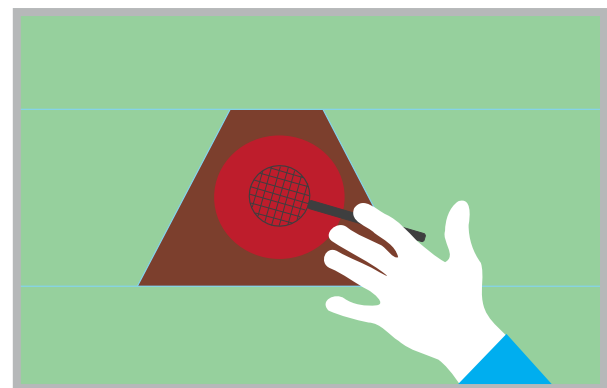


2. **TA** attaches a 3-way stopcock to the blood administration line of an empty blood collection bag (pre-filled with CPDA). **TA** then attaches a 60 mL luer lock syringe to the stopcock.



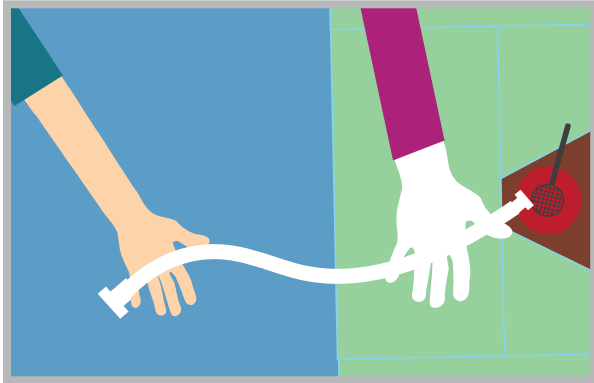
3. **TA** sterilely opens and offers **SA**:

- 1 x autoclaved tea/drain strainer
- 1 x extension set

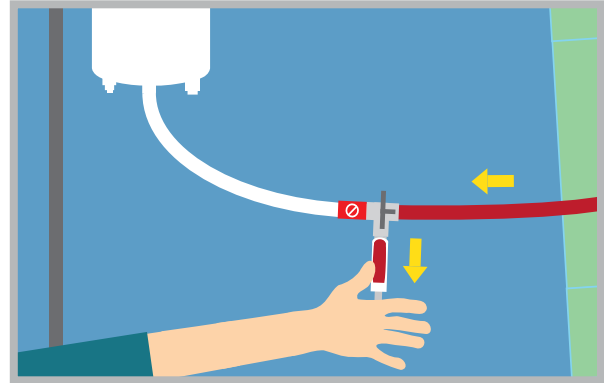


4. Upon entry to the abdomen, **VS** places sterile strainer into pooled blood, to hold back organs & large blood clots.

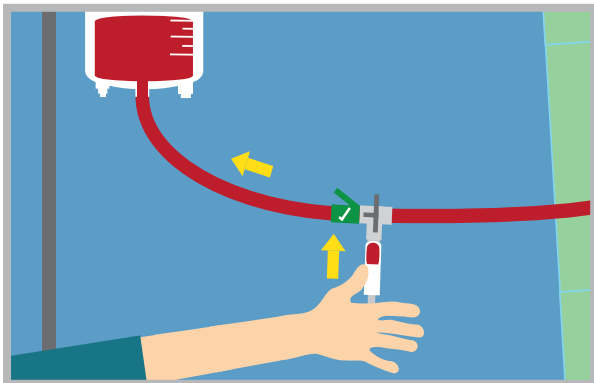
## Large Patients (Continued)



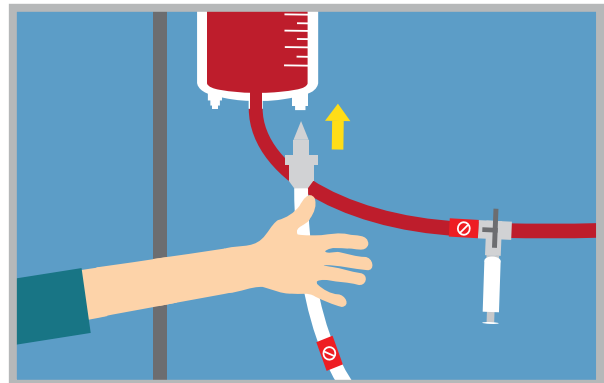
**5.** SA drops the free end of the extension line to TA, so it can be attached to the 3-way stopcock. While holding onto the sterile end, the SA introduces the sterile end of the extension line into the pooled blood with the strainer.



**6a.** TA closes the 3-way stopcock to the collection bag, opening it to the patient, & gently draws back on the 60 mL luer lock syringe to fill it completely.



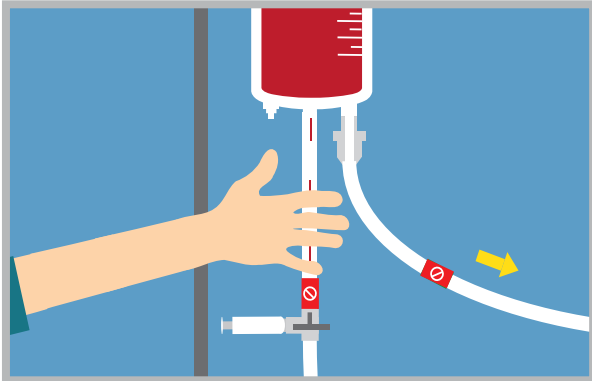
**6b.** Once filled, TA turns off the stopcock to the patient, opening the stopcock to the collection bag. TA gently presses the syringe plunger to deliver all 60 mLs into the blood collection bag. The process is repeated until the collection bag is filled.



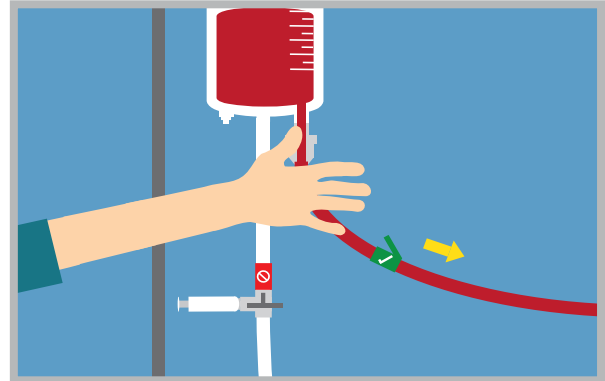
**7.** Once filled, TA attaches a blood administration set with its incorporated filter to the free port of the blood collection bag, which will be used to deliver the collected blood to the patient.

NOTE: for a volume of 450 mLs of blood to fill the bag, the 60 mL syringe must be filled 7.5 times. Keeping track of the volume drawn is very important. It is also important to note that at least 300 mLs of blood (5 x filled 60 mL syringes) has to be obtained for this type of administration as there will be 63 mLs CPDA pre-mixed into the collection bag.

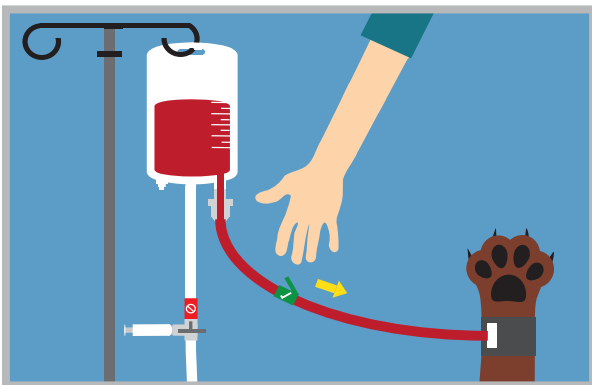
## Large Patients (Continued)



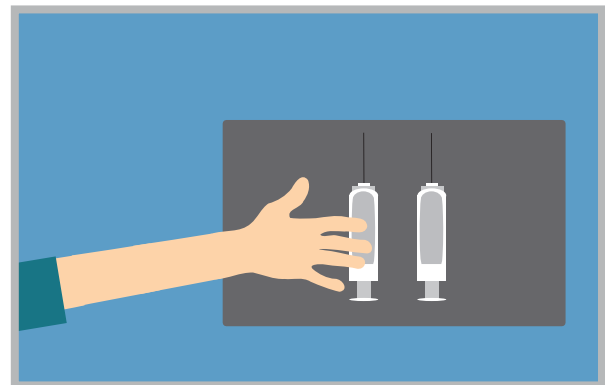
8. All remaining blood from the extension line is gently milked into the blood collection bag & the line is then clamped.



9. TA squeezes the chamber of the administration set to fill it with blood, then unclamps the line to allow it to fill with blood. Once the line is completely primed it is again clamped closed.

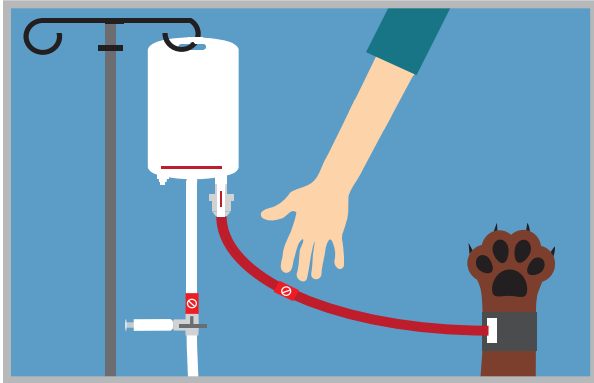


10. TA then attaches the blood administration set to the microclave T-connector & unclamps the line. Blood is allowed to drip as fast as gravity will allow. TA monitors the flow carefully. If the flow stops, the filter may be clogged & another administration set may be needed.

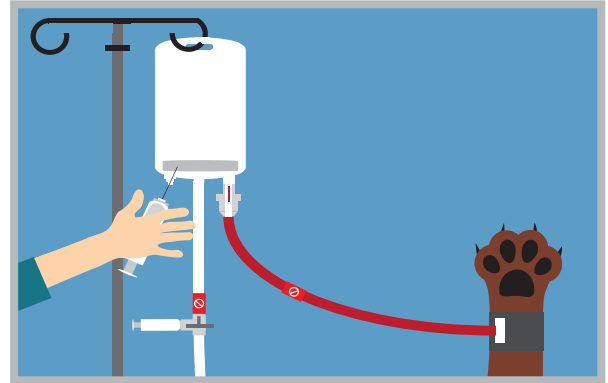


11. During the transfusion, TA fills two 60 mL syringes with 0.9% saline & sets them aside for future flushing.

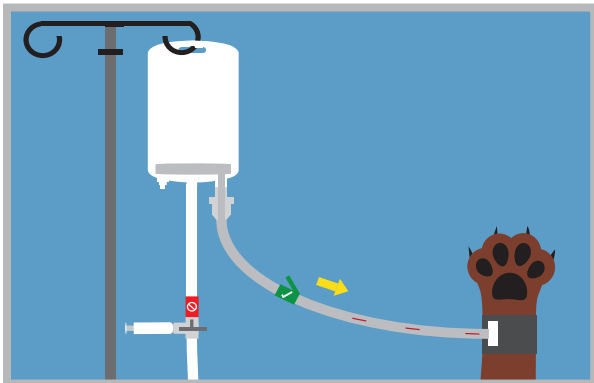
## Large Patients (Continued)



**12.** Once the transfusion is nearing the end, **TA** clamps the line immediately to avoid air from entering the system.



**13.** **TA** then injects several prefilled 0.9% saline syringes into the collection bag through an injection port.



**14.** **TA** unclamps administration line & the fluid is allowed to run as fast as gravity allows in order to flush the remaining blood into the patient. **TA** can repeat as needed, to flush all the blood collected into the patient while avoiding air in the line.