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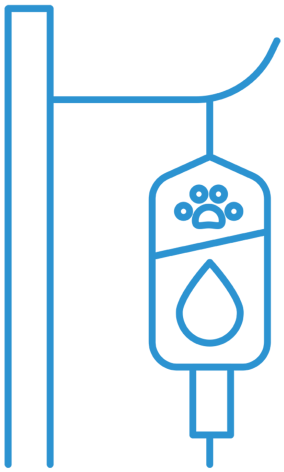

Transfusion Medicine

DRIP 5

April 28, 2022

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Be advised this document is here to enhance your learning experience and is a cumulative of the slides and transcript & area for your notes. You are welcome to take your notes electronically or print then use it to supplement your learning while watching the drip

Major Cross-Match

- X-match should be performed
  - In ALL cats
    - Administration of type specific blood is insufficient to prevent AHTR in Cats
  - Any dog with a previous (>4 days) or unknown transfusion history
- Can consider for dogs w/o transfusion history
  - may prevent development of alloantibodies to other blood types
  - May increase transfusion success if naturally occurring alloantibodies are present (ex: DEA 7)
- Helps prevent immune-mediated hemolytic transfusion reactions
- Requires donor blood and recipient serum

So a major cross-match should be performed in all cats. The administration of type specific blood in cats is insufficient to prevent acute hemolytic transfusion reactions, which is the major hemolytic transfusion reaction that we are concerned about. It should also be performed in any dog that has had a previous or unknown transfusion history. So if the transfusion has been greater than four days, then we are going to want to do a major cross-match.

It can be considered for dogs without transfusion history because of those other blood types that are out there. It's possible that you could still have a transfusion reaction, even if you give type specific blood. But I don't do that typically. I don't do a major cross-match for every dog. I basically do those only for those that have had a previous transfusion. And then, of course, for all cats, we want to do that as well. What we're trying to do is help prevent immune-mediated hemolytic transfusion reactions.

And basically, what you're doing is you are taking the donor blood and the recipient serum and you're basically doing a test to see if the recipient serum is going to attack the donor's blood that you're administering, OK?

This is an example of what this might look like. So hopefully you can kind of see that. Basically, what you're looking for in this tube agglutination is that if there are any red blood cells that are still left at the top of that gel column, then that is considered a positive test.

Positive, in this case, actually means do not transfuse with this particular blood product. And then a negative is if you have all or most of the red blood cells at the bottom of the gel column. What gets a little bit confusing is if you see the third one from the left up top or even the fourth one from the left on the top versus the third one from the left on the bottom, those sort of look a little bit similar.

But you'll notice that the difference is that none of them are stuck up on the top in that bottom photo. So there's still some in the column but none of the red blood cells are still stuck at the top of the gel column. So those are the only ones that get a little bit confusing. But most of the time, it's fairly easy to tell whether it's a positive or negative. And if you can't tell, then I would not administer that. And I would just run another cross-match or try another unit.

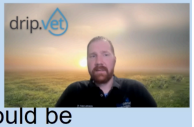
Minor Cross match

- Utilizes donor plasma and recipient red blood cells
- Tests for presence of alloantibodies in the donor
  - Less important due to dilutional effect and removal of most of the plasma from pRBCs
- Performed in same manner as major cross match
- Insufficient evidence exists to recommend for or against the use of a minor cross match when administering plasma in either a dog or a cat

A minor cross-match, on the other hand, sort of reverses that. So this utilizes the donor plasma and the recipient red blood cells. And this tests for the presence of antibodies in the donor. This is not near as important as a major cross-match and is not something that I really do with any type of routine time frame. So it's basically performed in the same manner as the major cross-match. But really insufficient evidence exists to recommend for or against the use of a minor cross-match when administering plasma in either a dog or a cat.

So I don't do them, not enough evidence really to make it worthwhile. And I've never really had significant issues that would change my mind on that.

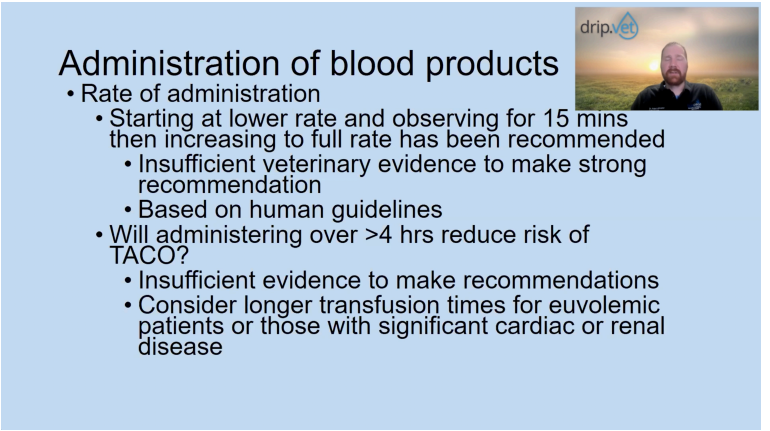
Administration of blood products



- Ensure the correct unit of blood/ plasma is being given to the correct patient
- Observe color and consistency of the unit
- Warm the unit if indicated
- Plasma should be thawed in a warm water bath at 37 °C (98.6 °F)
- Blood filters should be used for all transfusions
- Patients should be closely monitored while receiving transfusions
- No medications should be mixed with the blood and the only fluid that should be given is 0.9% NaCl

When you are administering blood products, you do want to ensure that the correct unit of blood or plasma is being given to the correct patient. That's sort of step number one. You want to take a look at the unit, observe the color and consistency of the unit. Make sure it doesn't have clots in it. Make sure it's not black or anything like that.

If you are going to warm the unit, you can go ahead and do that. You don't have to do that, particularly in life-threatening emergencies. So I have bolused packed red blood cells that have been in the refrigerator to a patient without warming those up, without major issue other than the patient might get a little cold, especially if it's smaller. But if you have the time to do that and want to, you can warm the unit up. Obviously, plasma that's frozen needs to be thawed in a warm water bath, so that will take some time. And then blood filters should be used for all transfusions. And then it's also important to make sure that you are closely monitoring the patients during the transfusions. In a couple of slides here, I'll show you an example of a sheet that you can use during transfusions to monitor their vitals and look for evidence of transfusion reactions. And then important as well not to mix any medications or fluids in with the blood products. The only fluid that you can give through the same catheter that you're giving a blood transfusion if you have to is 0.9% sodium chloride. So lactated Ringer's, Normosol-R, those sorts of things will interact with the blood. And you can't give those through the same catheter.

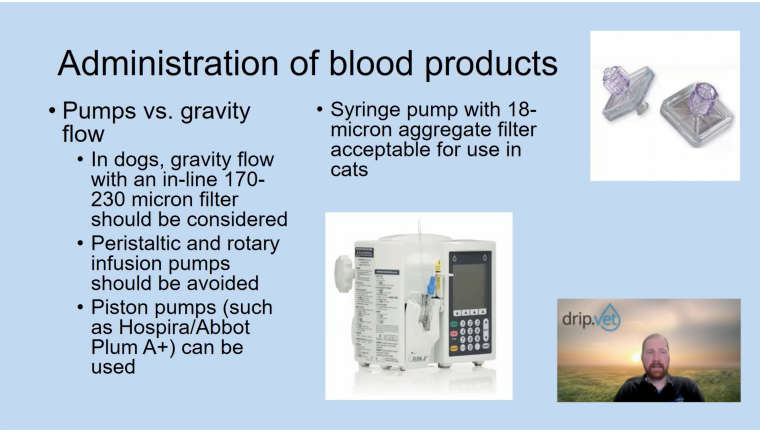


So the rate of administration of blood products. One of the things that is commonly said is that you should start at a lower than calculated rate. And then, basically observe them for 15 minutes and then increase to the full-rate. Sometimes people do the first five minutes they start it at a quarter of what they want. And then at 10 minutes, they go up to half. And then at 15 or 20 minutes, they go up to the full rate. This is based on human guidelines. But really, there is not sufficient evidence one way or another for veterinary patients to really make a strong recommendation on this. So this is how I was trained, so I still more or less do this. But there's really not sufficient evidence to say that need to do that.

The other thing is-- so the standard is basically to administer whatever blood product you're giving them over about four hours. So if you're giving 100 mLs of red blood cells, you would give that at 25 mLs an hour after four hours. And then, anything that was still in the bag would be considered essentially contaminated after four hours, so you would get rid of the remainder of that. So one of the questions is then related to TACO, which we will talk about as a transfusion reaction. That's transfusion associated circulatory overload. That's basically fluid overload from a blood product.

So the question is, if you have a patient at risk of that, does it make sense to actually give it or give the product over a longer period of time? So for instance, what you could do if you, again, want to give those 100 mLs, you could split the bag. You could keep 50 in the refrigerator, hang the other 50, give 50 over four hours. Pull the other 50 out of the refrigerator, hang that bag, and then give that over another four hours. And now it's the eight-hour transfusion without any waste, essentially.

So unfortunately, there's not really sufficient evidence one way or another to make a strong recommendation for that. So the recommendation is to basically consider it if you have a patient who's euvolemic. So that sometimes happens with immune-mediated hemolytic anemias. Those patients are not bleeding, so they're not losing volume. But they are losing red blood cells. So those guys sometimes you can overload. Or if you have a patient that has significant cardiac or renal disease and is just not fluid tolerant, that is another time you might want to consider giving it over a longer period of time.



When you are administering the product, there's a variety of different ways that you can do that. This can include basically gravity drip. So you can just hang the bag and let that drip in. There's infusion pumps. You can put them in various types of pumps like piston pumps or peristaltic pumps. So if possible, for dogs, they do recommend gravity flow with an inline filter. That has basically the least risk of damage to the red blood cells as it's being administered, so decreases the risk of hemolysis.

If you do have to put it on a pump, you should put it on a piston pump, so something like the Hospira or the Abbot Plum A+. The peristaltic or rotary infusion pumps should not be utilized for the administration of blood products. And then for cats, because they have smaller red blood cells and they're actually shaped a little bit differently, those actually tolerate being on a syringe pump with an 18 micron aggregate filter, which is the picture of that filter in the corner there. That is acceptable for use in cats, if needed.

Does administration technique really matter?

- Recent study[4] looked at different administration techniques and then measured plasma free hemoglobin and percent hemolysis
  - gravity-driven (control)
  - an infusion pump at maximal rate
  - application of a pressure bag
  - manual compression
  - syringe bolus
- No significant increases in % hemolysis or plasma fHb among any of the methods

So there was a study that came out not too long ago that looked at various different administration techniques and then measured plasma free hemoglobin and the percent hemolysis. And in this study, it's actually interesting, they didn't actually notice a significant increase in percent hemolysis or free hemoglobin among any of the methods. So gravity, infusion pump, pressure bag, manual compression, or syringe bolus all had similar recovery, essentially, or lack of hemolysis. So I guess take that for what you will.

I would say that if you need to get blood into a patient, just try to get the blood into the patient. But if you have the ability to control the way that you administer it, then giving it through, again, gravity control or through a piston pump is going to be still recommended. But if you don't have those and you still need to get the blood in, just do what you gotta do. Get the blood in them, and probably not going to cause a major issue.

Poll #2

Which of the following blood types can you administer to a DEA 1.1 negative (-) dog with no prior transfusion history?

A. DEA 1.1 Negative (-)

B. DEA 1.1 Positive (+)

C. EITHER/BOTH (+ or -)

Second quick poll here for you guys. See if you're paying attention. So which of the following blood types can you administer to a DEA 1.1 negative dog with no prior transfusion history?