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Western Australian Veterinary Emergency & Specialty

Transfusion Toolkit: From Products to Administration

(Canine and Feline)

Presented by Chantelle Alexander RVN

Let’s Take the Confusion out of Transfusion…

By the end of today, you will be able to:

- Understand when and why to give a transfusion
- Discuss key blood products and when to use them
- Escalate patient or lab changes to the vet
- Use a clear pre-transfusion checklist
- Confidently administer and monitor a transfusion
- (Hopefully!) Recruit a few new blood donors to WAVES

Supportive VS Curative

- Transfusions are **supportive**, not curative
- Once consumed, the **underlying disease can return**
- Aim is to diagnose and treat the **primary cause**, not just the symptoms

Why Give a Transfusion?

Main goals:

- Restore blood volume
- Improve oxygen-carrying capacity
- Correct coagulopathies

**Increase Protein Levels?

Plasma is NOT an efficient fix for hypoalbuminaemia

- Albumin contributes ~80% to maintaining oncotic (colloid osmotic) pressure
- Helps with transport, buffering, and maintaining vascular volume
- Hypoalbuminaemia can cause GI stasis, ileus, intestinal oedema, nutrient malabsorption

Rule of thumb: 4.5 mL/kg plasma to raise albumin by **1 g/L**.

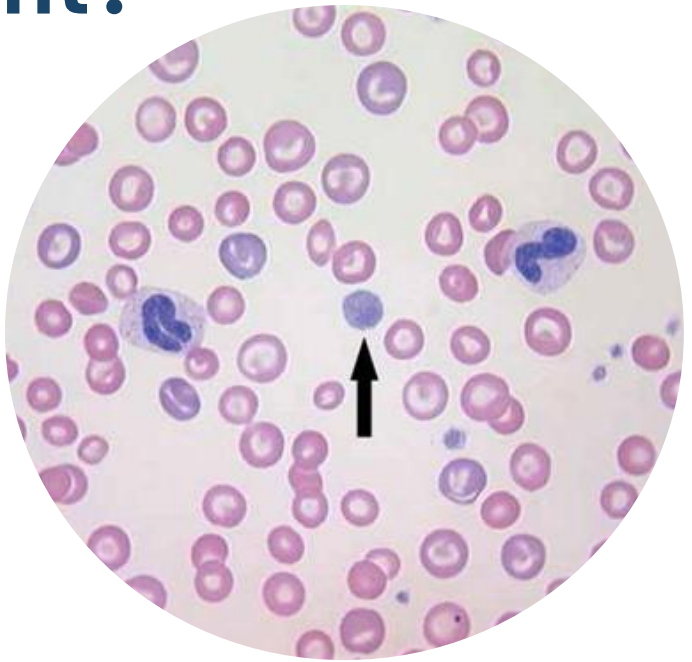
So, a 30 kg dog with albumin of 10 g/L needs **1350 mL** whereas a 5kg patient would require **225ml** to reach a target of **20g/L**

- **Expensive and requires high volumes;** increased risk of fluid overload

**Increase Platelet Count?

- Transfusions ≠ platelet support
- Only FWB replaces platelets
- Don’t rely on transfusions; treat **symptoms**, not just the **platelet count**

1 mL/kg of **fresh whole blood** increases platelets by ~**1 x 10^9/L**



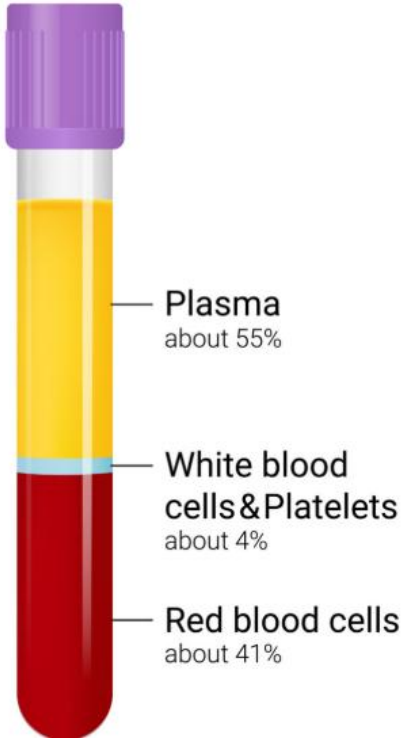
Fresh Whole Blood (FWB)

Fresh Whole Blood = RBCs + plasma + platelets + clotting factors

Use for patients who require:

- Anaemia with hypovolaemia
- Only way to transfuse functional platelets (can't be refrigerated)
- Rodenticide toxicity (RBCs + clotting factors)

2 mL/kg typically increases PCV by ~1%



Stored Whole Blood (SWB)

Stored Whole Blood = RBCs + plasma + clotting factors

- Refrigeration stops platelets working
- Contains proteins and some clotting factors (many degrade over time, namely V, VIII)

Packed Red Blood Cells (PRBCs)

Why choose PRBC's over Whole Blood?

- **Targeted therapy** (give only what the patient needs)
- Less risk of **volume overload**
- Fewer **plasma-related reactions**
- One donation = multiple patients

1 mL/kg typically increases PCV by ~1%

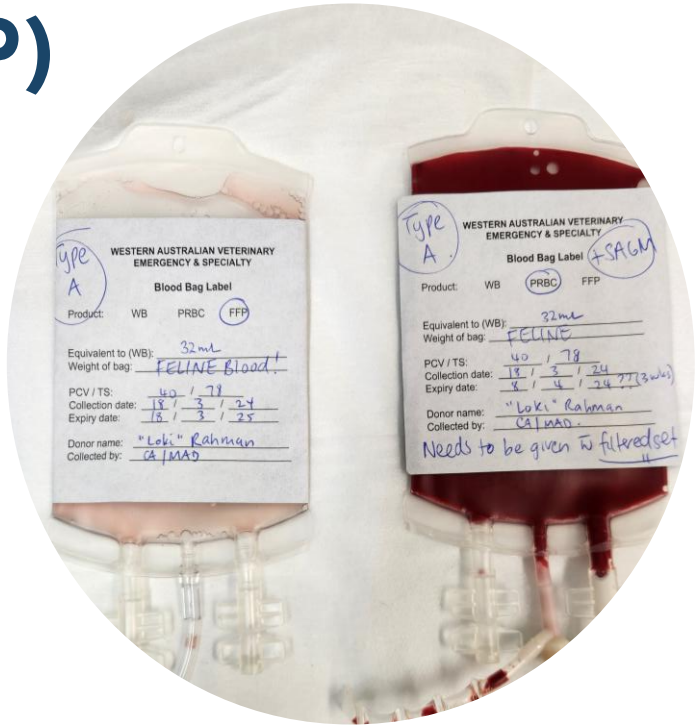
Fresh Frozen Plasma (FFP) & Frozen Plasma (FP)

- **Frozen Plasma:** frozen **>8 hrs after collection** *or* FFP that's **>1 year old**

**** Note:** Naming of plasma products (FFP vs FP) may vary between countries and blood bank organisations.

- Replaces **plasma proteins** (clotting factors, albumin, immunoglobulins)

FFP dose: 10–20 mL/kg to treat coagulopathy



CaniPlas (Hyperimmune Plasma)

- From dogs with boosted or natural immunity (post-infection or repeat vaccination)
- May contain antibodies that help fight parvo**

****Use is anecdotal – no strong evidence it improves outcomes**

- May help if albumin is low, but requires large volume (risk of fluid overlaod)

Cryoprecipitate (Honourable Mention)

- Plasma-derived, rich in fibrinogen, vWF, Factor VIII, XIII, fibronectin
- Made by slowly thawing FFP, then separating the protein-rich layer
- Small volume, targeted therapy for:
  - vWD
  - Haemophilia A
  - Hypofibrinogenaemia (DIC, severe bleeding)

Product	Targeted Applications
PRBCs	Anaemia (trauma, IMHA, chronic disease, surgical loss)
FFP	Coagulopathies (rodenticide toxicity, DIC, liver failure)
Frozen Plasma (FP)	Backup source for vitamin K-dependent factors (II, VII, IX, X)
Fresh Whole Blood (FWB)	Acute blood loss with need for red cells, clotting factors, and volume support
Cryoprecipitate	vWD, Haemophilia A, fibrinogen deficiency
Hyperimmune Plasma (Caniplas)	Passive immunity (parvovirus, sepsis)

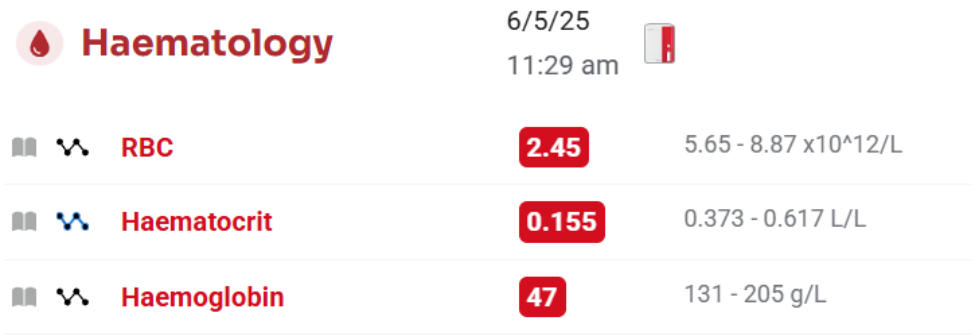
Patient Parameters

- **Trends matter more than isolated values:** one-off results can mislead; look at the bigger picture over time.
- **Tachycardia:** Compensation to improve perfusion
- **Tachypnoea:** Compensation to increase oxygen delivery
- **Pale mucous membranes:** Reduced red cell mass/haemoglobin
- **Weakness/lethargy:** Inadequate oxygen to muscles/brain
- **Cold extremities/weak pulses:** Peripheral vasoconstriction to prioritise vital organs

Normal Values

Species	Heart Rate	Temperature	Respiratory Rate
Canine	60-140 bpm	37.5°C – 39.2°C	>40 bpm (at rest)
Feline	140-200 bpm	38.0°C – 39.2°C	>44 bpm (at rest)

Lab Values: Automated



Haematology	6/5/25 11:29 am	
RBC	2.45	5.65 - 8.87 x10^12/L
Haematocrit	0.155	0.373 - 0.617 L/L
Haemoglobin	47	131 - 205 g/L

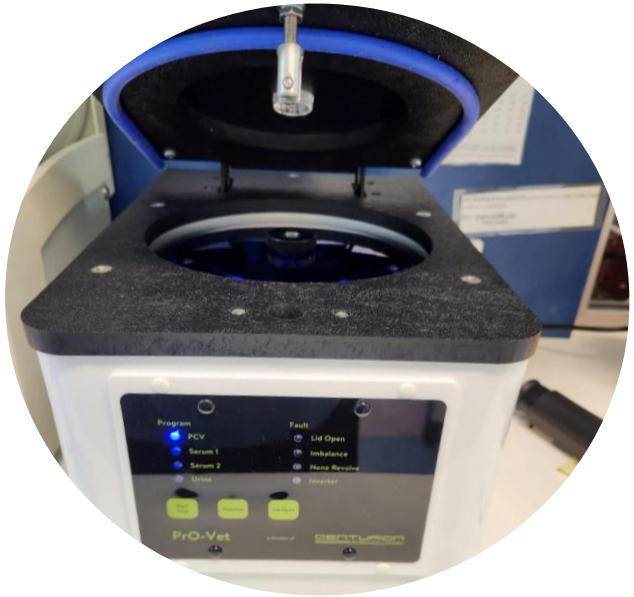
Haematocrit (HCT) – Automated

- **Calculated,** not directly measured like **manual PCV**
- Uses RBC count × MCV, calculated using electrical signals and light sensors.
- Influenced by:
  - **Sample issues:** hemolysis, clots, lipemia, icterus, storage.
  - **Analyzer issues:** calibration drift, misclassification, artifacts.
  - **Patient factors:** reticulocytosis, micro/macrocytosis, platelet clumping.

Lab Values- Manual

PCV (Packed Cell Volume) – Manual

- Manual equivalent of HCT
- Measured by spinning blood in a microhaematocrit tube
- **Acute vs chronic anaemia** (look at total solids & clinical signs)



Species	Packed Cell Volume (PCV)	Total Solids (TS)
Canine	35% - 55%	55-75 g/L
Feline	30% - 45%	60-80 g/L

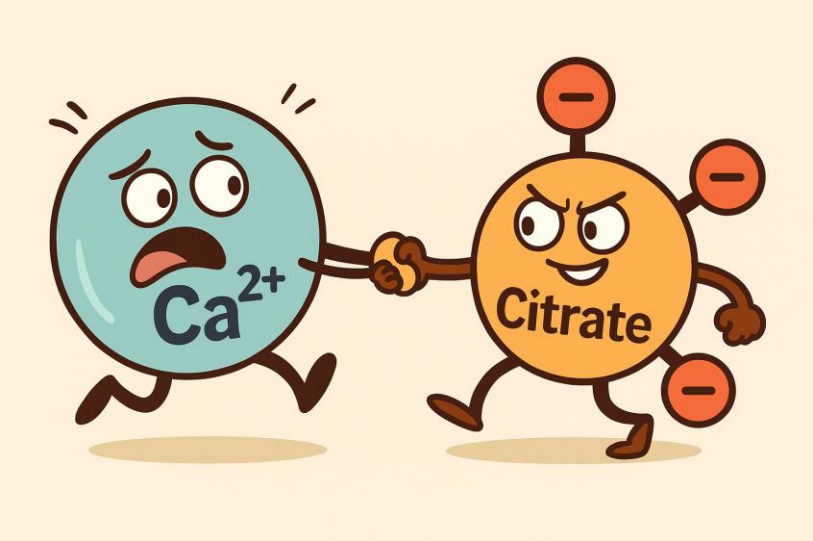
Pre-Transfusion Checklist

- 🧪 Fluids & Medications Check
- 💉 Venous Access & Function
- ✂️ IVC Placement
- 🩸 Blood Typing & Compatibility
- 🔬 Crossmatching & Safety
- 👀 Patient Assessment & Baseline Vitals

Fluid Type	Compatible with BT?	Notes
0.9% NaCl (Saline)	✅ Yes	Gold standard
Plasma-Lyte 148	✅ Yes	Generally safe
CSL/LRS	⚠️ No (if same line)	Contains calcium – risk of precipitation
5% Dextrose	❌ No	Can cause red cell clumping (pseudoagglutination), haemolysis, and interfere with detecting true reactions.
0.45% NaCl	❌ No	Hypotonic – causes haemolysis in red cells, may impair efficacy of plasma
Hypertonic saline	❌ No	Causes crenation in red cells, can denature proteins or affect plasma integrity

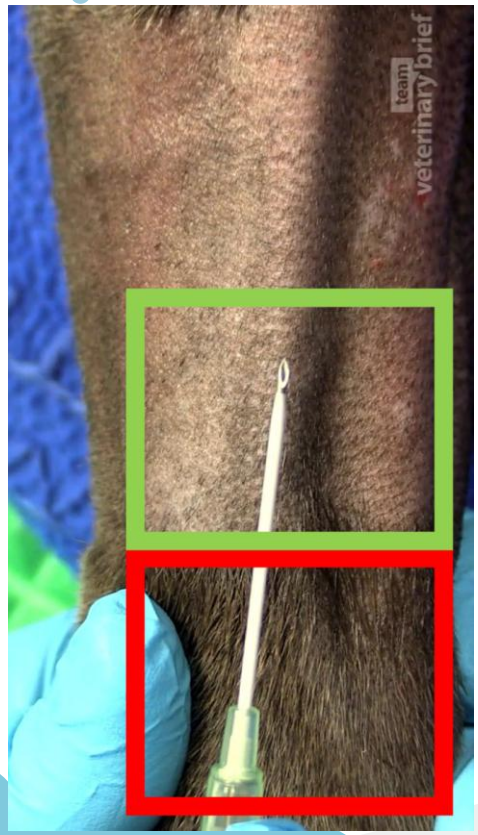
Fluids and Medications

- **Avoid calcium-containing fluids** (Hartmans, LRS)
- Ideally use **isotonic, calcium-free fluids**, such as:
  - 0.9% NaCl (Normal Saline)
  - Plasmalyte 148
- **Change the fluid bag** before transfusion
- **Prime all lines** (giving sets, T-pieces, extensions)
- **Avoid** IV antibiotics (metronidazole) and lipid emulsions



Venous Access

- Unwrap to check insertion site – no kinks, swelling, or leakage
- Flush to confirm patency
- Check for signs of phlebitis:
  - Redness
  - Swelling
  - Heat
  - Pain/discomfort



Placing an IVC

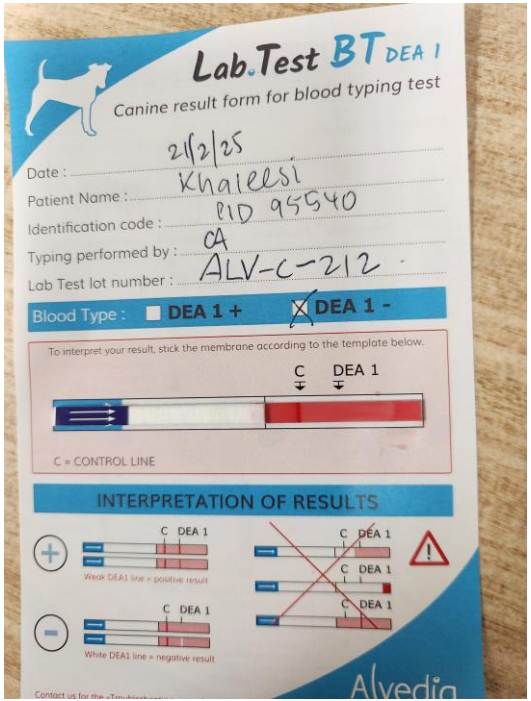
- **Clip wide** to minimise contamination
- **Clean off debris and allow to dry**

****Wipe away excess** chlorhex (esp. cats)

- **Avoid tape** over site
- **Collect bloods** at placement
- **Use largest gauge** suitable

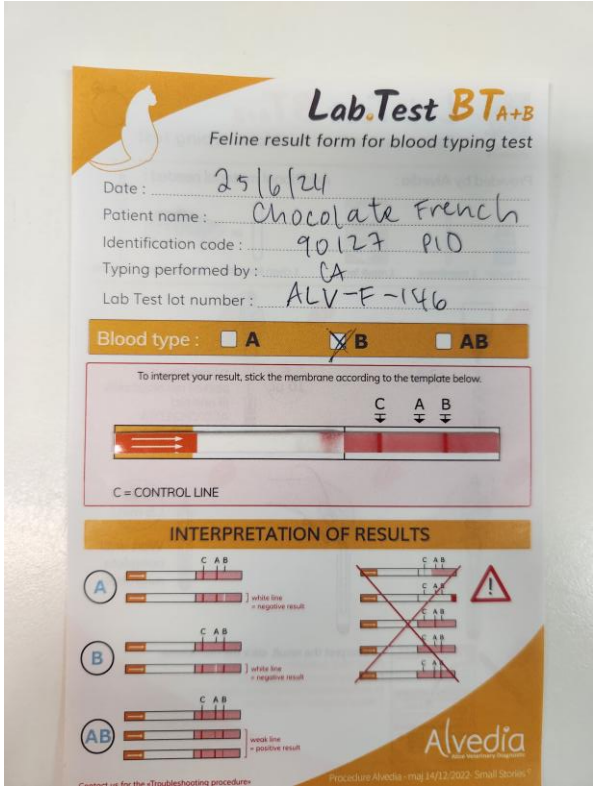
Blood Typing- Why it Matters

- Type all transfusion patients prior to administration
- Help prevents life-threatening reactions
- **Cats:** Must be typed before a transfusion if blood type is unknown
- **Dogs:** Type once, especially for donors or patients expected to have repeat transfusions



Feline Blood Typing

- **Type A** – Most common
  - Weak anti-B antibodies
  - *Can tolerate* Type B in true emergencies (not ideal)
- **Type B** – Less common (30% of cats in Perth)
  - Strong anti-A antibodies → severe/fatal reactions with Type A
  - Common in Persians, Ragdolls, British/Devon/Cornish Rex
- **Type AB** – Rare
  - Type A recommended donor blood



Canine Blood Typing

- Many types, but focus on **DEA 1**
  - **DEA 1 Positive** – has the antigen
  - **DEA 1 Negative** – doesn't
- **DEA 1 Negative**: should only receive DEA 1 Negative
- **DEA 1 Positive**: can receive either, but best to crossmatch
- Reactions usually occur with repeat transfusions

Species	Crossmatch Before First Transfusion?	Crossmatch Needed After Previous Transfusion?
Cats	✅ Yes — ideally always	✅ Yes — if >48 hrs since first transfusion
Dogs	❌Ideally yes — but not essential for a first-time	✅ Yes — if >4 days since first transfusion

When to Crossmatch?

- Recommended **even before any transfusion (canine & feline)**
- **Cats** have **natural antibodies** → high reaction risk
- Some cats have **anti-Mik antibodies** → can cause transfusion reactions even when donor and recipient are the same blood type
- Ideally, always **type + crossmatch** whenever possible
- Can skip crossmatch if:
  - **Type is known**
  - **Time-critical case** (patient crashing)

Incidence of incompatible crossmatch results in dogs admitted to a veterinary teaching hospital with no history of prior red blood cell transfusion

Adesola Odunayo DVM, Kayode Garraway DVM, Barton W. Rohrba...

View More +

- 149 dogs with **no prior transfusions**
- All donors were DEA 1.1, 1.2, and 7 negative; DEA 4 positive (**ideal donor dogs** with **low-risk blood types)**
- Still, **17% showed incompatibility** with 1 or 2 donors during crossmatching
- Dogs who were crossmatched had a **better rise in HCT** — suggesting longer red cell survival.

Takeaway: Even “virgin” dogs can have unexpected antibodies → **crossmatch when possible**.

Major vs Minor Crossmatch

Major Crossmatch

- Tests **recipient plasma vs donor RBCs**
- Detects antibodies that could destroy donor red cells
- **Most important** and most commonly used in clinic

Minor Crossmatch

- Tests **donor plasma vs recipient RBCs**
- Useful when using **fresh whole blood**
- Helps detect **donor antibodies** that might react with recipient cells

Administering Blood Products Safely

- Check **product label** (type, expiry, volume)
- Review **fluids & CRIs**
- Prepare equipment (monitors, infusion pumps, transfusion records, filtered giving sets)
- **Assess the Patient:** Look beyond numbers **(mentation, behaviour, respiratory effort)**
- Provide supportive care as needed (oxygen, antiemetics if nauseous, active warming etc)

Visual Inspection of Blood Product

- No **air bubbles**
- Colour: **rich red**, not dark/black
- No **cracks**, **leaks**, or **damaged seals**
- Must be **sterile**
- If in doubt, **don’t use it — tell the vet!**

Blood Filtered Giving Sets

- Always use a **blood filtered giving set** for all blood products
- Filters remove clots, debris & aggregates
- Use an **infusion pump** where possible
  - Controls **rate**
  - Tracks **total volume**
- Avoid infusion pumps unless designed for blood products

Infusion Rate & Monitoring

- Monitor patient **every 5 mins** until at target rate (HR, demeanor, temp, RR & RE)
- Final rate depends on:
  - **Product type**
  - **Vitals & disease status**
  - **Co-morbidities** (cardiac disease)
- Aim to complete transfusion within **4 hours**

Infusion Rate (cont'd)

- **Start slow** for first 15–30 mins to monitor for reaction
- **Most patients** aim for a rate of **10 mL/kg/hr**
- **Cardiac/overload** risk: **4 mL/kg/hr**
- **Critical (shock/anaemia):** As fast as needed
- Vet discretion applies! **Keep monitoring & communicating**

Blood Transfusion Record

Date:	14/2/25	Blood product used:	PRBC
Patient name:	Lily Oldfield	Donor name:	Bonnie Bolton
Patient ID:	97462	Expiry:	6/3/25
Pre-transfusion PCV/TS:	13/76	Volume administered:	100ml
Post-transfusion PCV/TS:	30/65	SMS Donor's Family	☐ tick for yes

Time	Time Elapsed	Rate (ml/hr)	Demeanour	Temp	Pulse	Resp Rate	Comments
2.25 pm	0	5	QAIC	38.3	160	Pant	
2-30	5	10	QAIC	38.4	130	Pant	
2 35	10	15	QAIC	38.4	116	52	
2-40	15	20	QAIC	38.4	112	44	
2-45	20	30	QAIC	38.4	112	44	
2-55	30	30	QAIC	38.4	116	40	
3-25	1 hour	55	QAIC	38.5	108	Pant	
3-55	1h 30	55	QAIC	38.0	94	32	↑
4-25	2h	55	QAIC	38.3	80	Pant	
	2h 30						

Recognising Transfusion Reactions

Immunological (immune-mediated):

Febrile (most common):

- Temp ↑ > 0.5 °C, ↑ HR, ↑ RR, ↑ RE

Allergic:

- Hives, facial swelling, vomiting

Haemolytic (rare/severe):

- Red urine, collapse, dull mentation

TRALI (lung injury):

- Respiratory distress, hypoxia

Anaphylaxis:

- Hypotension, collapse, vomiting

Recognising Transfusion Reactions

Non-immunological:

Fluid overload (TACO):

- ↑ RR/effort, crackles, distended jugulars

Sepsis (contaminated product):

- Sudden fever, hypotension, shock

Electrolyte disturbances (Ca, K, Mg):

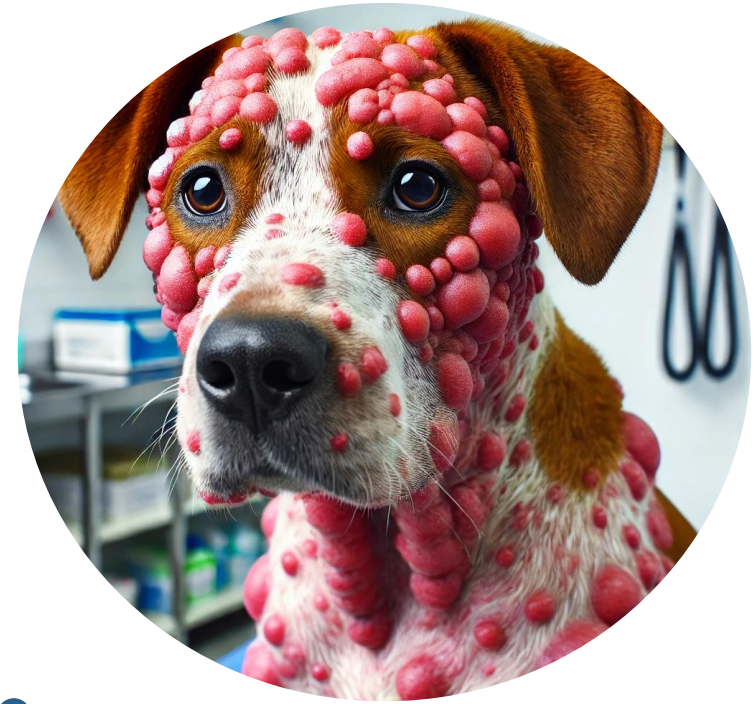
- Muscle tremors, arrhythmias

Embolism or massive transfusion complications

- ↑ HR, ↑ RR, ↑ RE, hypotension, collapse, altered mentation, cyanosis or hypoxia, arrhythmias or ECG changes.

Suspected Transfusion Reaction – What Now?

- **Stop transfusion**
- **Alert the vet immediately,** may be mild (WBCs/IgG) or serious (acute haemolysis)
- Continue to monitor, watch for improvement or decline
- May **restart** with:
  - 💊 Premedication
  - 🕒 Slower infusion rate



WAVES Blood Bank

- Fear-free, positive visits to start with
- Dogs, donation via **cephalic vein**
- Dogs, no sedation typically required
- Cats are screened for **FIV, FeLV, Mycoplasma** at first visit
- Cats are sedated for comfort, donation from a **jugular vein**
- **Supported by IDEXX, Prime 100, Greenies**



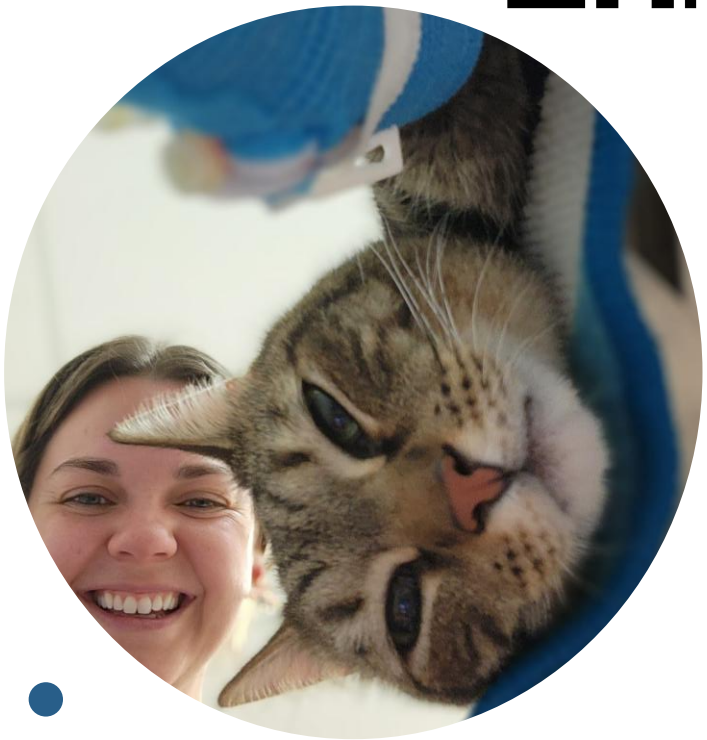



Canine Blood Donors

- **1–7 years old**
- **Over 28 kg** lean body weight
- Up to date with **vaccinations & parasite prevention**
- **Healthy** with no signs of illness
- **Never received** a blood transfusion previously
- **Never had a litter**
- **Friendly, calm** temperament

Feline Blood Donors

- **1–7 years old**
- **Over 4 kg** lean body weight
- **Indoor-only** preferred
- Up to date with **vaccinations & parasite prevention**
- **Healthy** with no signs of illness
- **Never received** a blood transfusion
- **Calm, handleable** temperament

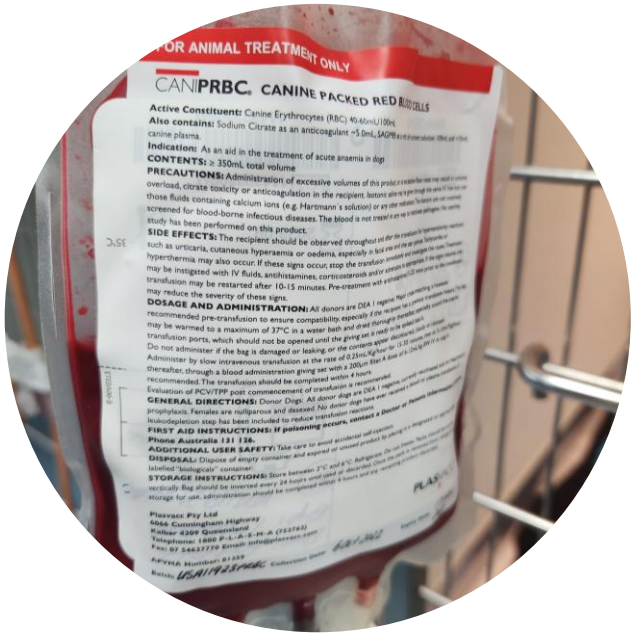


WAVES PlasVacc PRBCs

- **CaniPRBC** available only when blood bank stock allows
- **WAVES is a collection point only** – we **don't hold stock**
- **First in, best dressed** – supply is limited
- **No money exchanged** between WAVES and your clinic
- **Must be registered** with Plasvacc as an authorised site
- **PO must be completed** (signed at collection or submitted electronically)
- **Taxi collection possible** – PO must be received before dispatch
- We can only release the **nearest-to-expiry** unit
- **No returns** – once it leaves WAVES, it's yours
- Need a filtered giving set? **Let us know when requesting**

Registered Clinics for PRBC Collection

Animal Emergency Care
Animalius Vet
Baldivis Vet Hospital
Bicton Vet Clinic
Claremont Vet Clinic
Comet Bay Vet Hospital
Duncraig Vet Hospital
Foothills Animal Hospital
Hamilton Hill Vet Hospital
Hammond Park Vet Clinic
Kalamunda Vet Hospital
Kwinana Vet Clinic
Malibu Vet Hospital
Millpoint Vet Centre
New Era Veterinary
Perth Vet Emergency
Ranford Vet Hospital
Sage Vets
Success Vets
Wanneroo Vet Hospital
Warnbro Vet Hospital



Questions??

Thank you for attending!!

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Thank you to Dr Katrin Swindells and Dr Ryan Ong for all your support and for patiently answering my endless questions!