

● DIANE'S NGN NCLEX 2026 STUDY SERIES · HEMATOLOGY / PHARMACOLOGY

Blood Transfusion & ABO/Rh Compatibility

High-yield clinical judgment for safe administration, reaction recognition, and emergency response. Master the universal donor/recipient logic and the life-saving "Stop the Blood" rule.

PRIORITY ACTION: STOP

0.9% NS ONLY

2 RN VERIFICATION

4-HOUR MAX

18-GAUGE IV



SECTION ONE

Definition & Why It Matters

01

What it is: The IV infusion of compatible donor blood products (whole blood, PRBCs, platelets, FFP, cryoprecipitate) to replace lost volume, restore oxygen-carrying capacity, or correct coagulation deficits.

02

Why it matters: Even one drop of incompatible blood can trigger a fatal hemolytic reaction. Most life-threatening reactions occur within the **first 50 mL** or **first 15 minutes**.

03

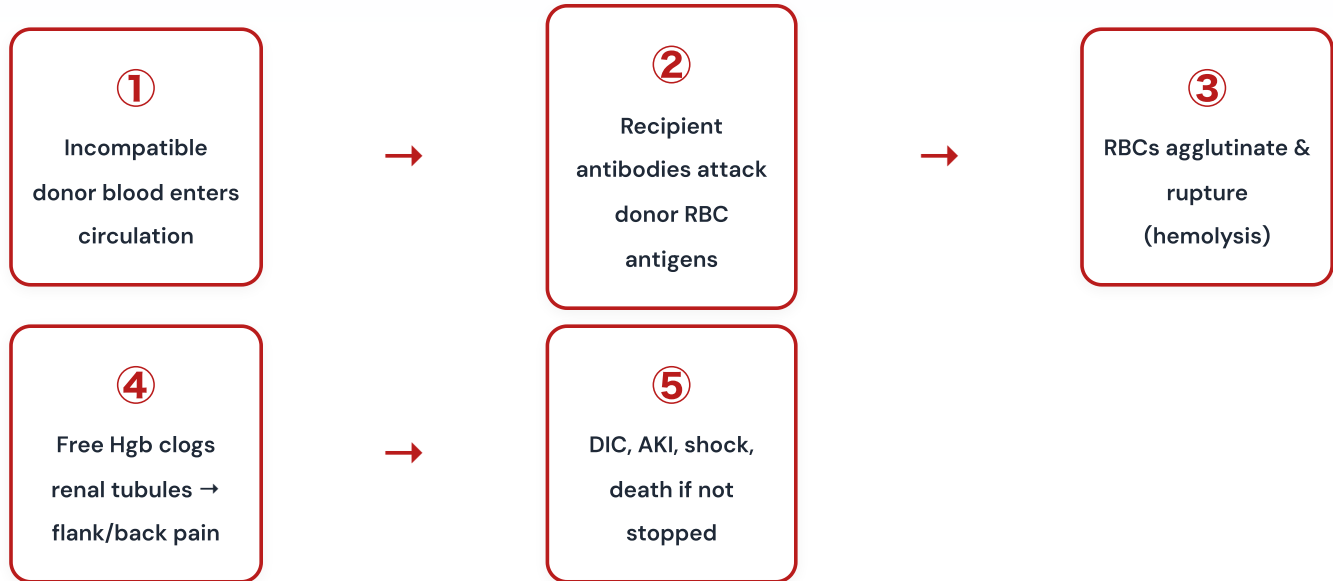
Nursing accountability: Two RN identity verification, baseline VS, type & cross match, and bedside vigilance are non-delegable. Errors here cause patient deaths and license loss.

2

SECTION TWO

Pathophysiology — Antigen ↔ Antibody Reactions

RBCs carry surface **antigens** (A, B, Rh). Plasma carries **antibodies** against antigens NOT on the patient's own RBCs. When mismatched blood is given, antibodies bind to donor RBC antigens → agglutination → hemolysis → kidney damage and shock.



RED FLAG

Low back / flank pain during transfusion = hemolytic reaction until proven otherwise. The kidneys are being damaged by lysed RBC debris.

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SECTION THREE

ABO & Rh Compatibility — The Universal Logic

Recipient ↓ Donor →								
Recipient	O-	O+	A-	A+	B-	B+	AB-	AB+
O-	✓	✗	✗	✗	✗	✗	✗	✗
O+	✓	✓	✗	✗	✗	✗	✗	✗
A-	✓	✗	✓	✗	✗	✗	✗	✗
A+	✓	✓	✓	✓	✗	✗	✗	✗
B-	✓	✗	✗	✗	✓	✗	✗	✗
B+	✓	✓	✗	✗	✓	✓	✗	✗
AB-	✓	✗	✓	✗	✓	✗	✓	✗
AB+	✓	✓	✓	✓	✓	✓	✓	✓

Read it: Find the recipient row → look across to see which donor types they can safely receive (✓ green) or must NOT receive (✗ red).

O⁻

~7% population

UNIVERSAL DONOR

AB⁺

~3% population

UNIVERSAL RECIPIENT

A

A antigen
anti-B antibody

B

B antigen
anti-A antibody

AB

Both antigens
NO antibodies

O

No antigens
Both antibodies

Rh Factor Rule: Rh⁻ patients must NEVER receive Rh⁺ blood (forms antibodies → future reactions). Rh⁺ patients can receive either.

OB Critical: Rh⁻ mother + Rh⁺ baby = give RhoGAM at 28 wks & within 72 hrs of delivery to prevent erythroblastosis fetalis in future pregnancies.

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SECTION FOUR

Pre-Transfusion Protocol — The Setup

- **Verify HCP order** + obtain informed consent (signed by client).
- **Type & Crossmatch** drawn within 72 hrs — confirms ABO/Rh compatibility between donor and recipient.
- **Baseline assessment:** Temperature, full vital signs, lung sounds — these are your comparison data for detecting reactions.
- **Patent IV access** with **18-gauge** catheter (large bore prevents RBC hemolysis from turbulent flow). 20-gauge acceptable for slow rates / small veins.
- **Prime tubing with 0.9% Normal Saline ONLY.** Dextrose causes RBCs to lyse/clump; LR contains calcium → clotting.
- **Two-RN bedside verification:** patient name, MRN, ABO/Rh, blood unit number, expiration, crossmatch label.
- **Time limit on the unit:** blood must be hung within **30 minutes** of leaving the blood bank (bacterial growth + RBC damage risk).
- **Central line transfusion?** Blood must be **warmed** to prevent hypothermia and cardiac dysrhythmias.

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SECTION FIVE

Signs & Symptoms — Recognize the Reaction

REACTION TYPE	SEVERITY	HALLMARK SIGNS	CAUSE
Hemolytic (ABO incompatibility)	LIFE-THREAT	Low back / flank pain , fever, chills, hypotension, tachycardia, flushing, tachypnea, hemoglobinuria (red urine), DIC	Recipient antibodies attack donor RBCs → mass hemolysis. The classic NCLEX killer.
Febrile (non-hemolytic)	MODERATE	Chills → fever (rise $\geq 1^{\circ}\text{C}$ / 1.8°F), headache, flushing, tachycardia, anxiety. No back pain.	Recipient sensitivity to donor WBCs / cytokines. Most common reaction; often in patients with prior transfusions.
Allergic (mild → anaphylactic)	VARIABLE	Mild: hives (urticaria), itching, flushing. Severe: wheezing, bronchospasm, dyspnea, anxiety , hypotension, shock.	Recipient reacts to donor plasma proteins. Severe form most common in IgA-deficient patients.
Circulatory Overload (TACO)	LIFE-THREAT	Cough, dyspnea, crackles, distended neck veins, tachycardia , $\uparrow$ BP. Looks like CHF.	Volume infused too fast for cardiac capacity. Higher risk: elderly, infants, cardiac/renal patients.
Septic (bacterial)	LIFE-THREAT	Rapid-onset high fever, severe chills, hypotension, vomiting, shock.	Contaminated blood product. Cultures + broad-spectrum antibiotics.

🚑 THE 50-ML / 15-MINUTE RULE

Most life-threatening reactions occur within the **first 15 minutes** or **first 50 mL**. Stay at the bedside for the first 15 minutes. Run at 2 mL/min during this period.

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SECTION SIX

Priority Interventions if Reaction Suspected (ABCs)

1

STOP the Transfusion

Immediately clamp the blood line. This is **always** the first action — prevents more incompatible blood from entering.

2

Maintain IV with NS

Switch to 0.9% Normal Saline using **new tubing** (don't push residual blood from old line into vein).

3

Assess & VS

Vital signs, breath sounds, oxygen saturation. Stay with the patient. Reassure.

4

Notify HCP & Blood Bank

Both must be informed immediately. Document the reaction and interventions.

5

Send Samples to Lab

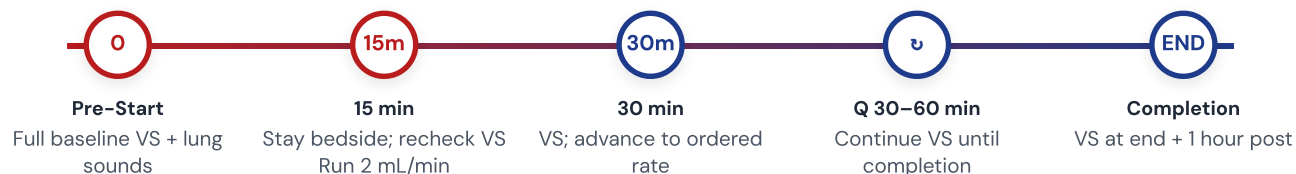
Blood + urine sample from patient → checks for hemoglobinuria/hemolysis. Send blood bag + tubing back to blood bank.

6

Administer Ordered Meds

Per HCP: diphenhydramine (allergic), antipyretics (febrile), epinephrine (anaphylaxis), diuretics (TACO).

Vital Signs Monitoring Timeline



SECTION SEVEN

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Pharmacology — Solutions, Pre-Meds & Reaction Drugs

DRUG / SOLUTION	USE	KEY NURSING PEARL
0.9% Normal Saline	Only solution compatible with blood; primes tubing; maintains line during reaction.	NEVER use D5W (hemolysis) or LR (calcium causes clotting).
Diphenhydramine (Benadryl)	Pre-medication and/or treatment for mild allergic reaction (hives).	Watch for sedation, dry mouth, urinary retention. IV push slowly.
Acetaminophen (Tylenol)	Pre-medication for febrile reactions in patients with prior febrile history.	Avoid in liver disease. Max 4 g/day (3 g if elderly/liver impaired).
Epinephrine	Anaphylactic reaction — bronchospasm, severe hypotension.	IM 1:1000 for anaphylaxis. Causes ↑ HR, anxiety, tremor.
Furosemide (Lasix)	Circulatory overload (TACO) — pulmonary congestion.	Slow rate first; monitor K ⁺ (hypokalemia), BP (hypotension).
Hydrocortisone	Severe allergic / anaphylactic reaction (delayed effect).	Monitor blood glucose; immunosuppression risk.

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SECTION EIGHT

NCLEX Test Traps

✗ THE TRAP

"Notify the provider first" when a reaction is suspected.

✓ THE RIGHT ANSWER

STOP the transfusion FIRST. Then maintain IV with NS, then notify provider.

✗ THE TRAP

Hanging blood with D5W or LR running.

✓ THE RIGHT ANSWER

0.9% NS only. Dextrose lyses RBCs; LR's calcium causes clotting.

✗ THE TRAP

Confusing back pain with positioning discomfort.

✓ THE RIGHT ANSWER

Low back pain = hemolytic reaction until proven otherwise. Stop the blood.

✗ THE TRAP

"Slow down the rate" for a transfusion reaction.

✓ THE RIGHT ANSWER

STOP — don't slow. Slowing is for circulatory OVERLOAD only, not reactions.

✗ THE TRAP

Letting unit hang for 5+ hours to "finish slowly."

✓ THE RIGHT ANSWER

Max infusion = 4 hours. Bacterial growth risk. Return to lab if unfinished.

✗ THE TRAP

Adding meds or piggybacking into the blood line.

✓ THE RIGHT ANSWER

NEVER. No medications in or with blood — ever.

✗ THE TRAP

Confusing TACO (overload) with hemolytic reaction.

✓ THE RIGHT ANSWER

TACO = wet lungs + JVD + ↑BP (slow rate, give Lasix).

Hemolytic = back pain + fever + ↓BP (STOP transfusion).

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SECTION NINE

Patient & Family Education



Report Symptoms Immediately

Tell the nurse right away about chills, itching, hives, back pain, shortness of breath, nausea, or feeling "weird/anxious." Do not wait.



Expect Frequent Checks

The nurse will be at your bedside for the first 15 minutes and will return often to check vital signs and breathing.



Informed Consent

Understand the reason, benefits, risks (reaction, infection), and alternatives (autologous donation, directed donation, refusal).



Religious / Cultural Considerations

Honor patient values (e.g., Jehovah's Witnesses may decline). Discuss alternatives like cell salvage, EPO, IV iron with the team.



Duration & Process

One unit takes 2–4 hours. Bathroom needs should be addressed before starting. Stay still — keep the IV arm comfortable but unmoved.



Post-Transfusion Awareness

Some delayed reactions occur hours to days later (jaundice, fatigue, fever, dark urine). Call the provider if these develop after discharge.

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SECTION TEN

Memory Boosters & Mnemonics

"S-T-O-P" — When Reaction Suspected

- S** **Stop** the transfusion immediately
- T** **Tubing** — switch to NS with new tubing
- O** **Observe** patient + VS, stay at bedside
- P** **Phone** the HCP & blood bank, send samples

"H-A-F-S" — The 4 Reaction Types

- H** **Hemolytic** — back pain (worst!)
- A** **Allergic** — hives, wheezing
- F** **Febrile** — chills + fever (most common)
- S** **Septic** — high fever + shock

"O Negative = Universal Donor"

O = Zero antigens → no antigens for recipient antibodies to attack → safe for all.

AB+ = **Universal Recipient** (has both A & B antigens + Rh+ → no antibodies present to attack any donor blood).

The "2's & 4's" of Transfusion

- 2** **2 RNs** verify at the bedside
- 2** **2 mL/min** for the first 15 min
- 2** **2 samples** sent if reaction (blood + urine)
- 4** **4 hours** max infusion time
- 1/2** **1/2 hour (30 min)** max on unit before start

⚡ Pattern Recognition Cheats

- "Low back pain" in a transfusion question → hemolytic reaction → *Stop the blood.*
- "Crackles + JVD + tachycardia" → circulatory overload → *slow the rate, give Lasix.*
- "Hives + itching" (only) → mild allergic → *slow rate, antihistamine* (only reaction where slowing is OK).
- "Sudden high fever + hypotension" → septic reaction → *Stop, cultures, antibiotics.*
- **Solution choice** = always 0.9% NS. If you see anything else, it's wrong.
- **Universal donor** = **O negative**. Universal recipient = **AB positive**. (O has nothing to attack; AB has nothing to attack with.)

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NCJMM · CLINICAL JUDGMENT MEASUREMENT MODEL

Apply Your Thinking

Scenario: A 64-year-old client with anemia is receiving the second of two units of PRBCs. Twenty minutes into the second unit, the client reports "my back is killing me," appears flushed, and complains of chills. VS: T 102.2°F, HR 124, BP 88/52, RR 26, SpO₂ 94%. The first unit infused without incident.

Step 1 · Recognize Cues

What stands out?

Back pain + fever + chills + hypotension + tachycardia + flushing during transfusion. **Classic hemolytic reaction.** First unit's success doesn't matter — this is a NEW unit.

Step 2 · Analyze Cues

What's happening?

Recipient antibodies are attacking donor RBC antigens — likely an ABO/Rh incompatibility (clerical or labeling error) → mass hemolysis → kidney injury risk → shock.

Step 3 · Prioritize Hypotheses

Most urgent concern?

Acute hemolytic transfusion reaction (life-threatening) > septic reaction > severe febrile non-hemolytic. Back pain + hypotension shifts this away from a simple febrile reaction.

Step 4 · Generate Solutions

What is the FIRST action?

STOP the transfusion immediately. Then: maintain IV with 0.9% NS via new tubing, stay with patient, full VS, notify HCP & blood bank, send blood + urine samples.

Step 5 · Take Action

Implement

Clamp blood, hang NS new tubing, oxygen as ordered, IV fluids for BP support, anticipate orders for diphenhydramine, antipyretic, possible vasopressors. Foley to monitor urine output (watch for hemoglobinuria).

Step 6 · Evaluate Outcomes

Did it work?

Goals: BP stabilizes ≥90/60, HR < 100, T trending down, no DIC labs, urine output ≥ 30 mL/hr and clear (not red/cola). Document timeline, interventions, and patient response. File occurrence report.

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