DIANE'S NGN NCLEX 2026 VISUAL STUDY LIBRARY

Thrombolytic *Therapy*

High-yield NGN review of "clot busters" — alteplase (tPA), reteplase, tenecteplase, streptokinase. Time-critical pharmacology for acute STEMI, ischemic stroke, and massive pulmonary embolism. Bleeding is the priority risk.

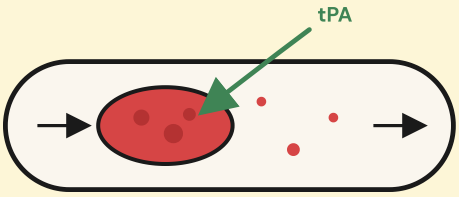
CARDIOVASCULAR | PHARMACOLOGY | EMERGENCY/CRITICAL CARE | HIGH-ALERT MEDICATION

Sourcing note: This topic was not present in Diane's uploaded reference notes. Content drawn from standard NGN NCLEX 2026 references (Saunders Comprehensive Review, ATI RN Pharmacology, Lippincott Pharmacology, AHA/ASA 2024 stroke guidelines, ACLS protocols).

1 Definition & Overview

WHAT & WHY

- **"Clot busters"** — fibrinolytic medications that **dissolve existing thrombi (clots)** by activating plasminogen.
- Used in acute **ischemic stroke, STEMI, massive PE, and acute arterial occlusion** — emergencies where restoring blood flow saves tissue.
- **TIME IS TISSUE.** Door-to-needle time is the most important safety/quality metric. Every minute without perfusion = more dead myocardium or neurons.
- High-alert medication — **bleeding is the #1 adverse effect**. Strict screening for contraindications is required *before* administration.



Clot Dissolved → Flow Restored

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Pathophysiology & Mechanism

STEP-BY-STEP

Thrombolytics convert **plasminogen → plasmin**, which enzymatically breaks down the **fibrin mesh** holding a clot together. Unlike anticoagulants (which *prevent* new clots), thrombolytics *dissolve existing ones*.

1. CLOT BLOCKS ARTERY
2. TISSUE ISCHEMIA BEGINS
3. TPA GIVEN IV
4. PLASMINOGEN → PLASMIN
5. FIBRIN BREAKS DOWN → FLOW RESTORED

! **KEY DISTINCTION**

Anticoagulants (heparin, warfarin) *prevent* clot formation. **Antiplatelets** (aspirin, clopidogrel) *prevent* platelet aggregation. **Thrombolytics** are the only class that *dissolves* existing clots — and that's exactly why bleeding risk is so high.

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Indications & Critical Time Windows

TIME IS TISSUE

ISCHEMIC STROKE
≤ 4.5 hrs
From symptom onset. Must confirm with **CT scan** first to rule out hemorrhagic stroke.

STEMI (MI)
≤ 30 min
Door-to-needle. Ideally given within **6–12 hrs** of chest pain onset.

MASSIVE PE
Urgent
Hemodynamically unstable patients with confirmed PE — given when benefits outweigh bleed risk.

CONDITION	GOAL	KEY PRE-TREATMENT STEP
Acute ischemic stroke	Restore cerebral perfusion before infarct completes	Non-contrast head **CT** to rule out hemorrhage; check glucose & BP
STEMI	Reperfuse coronary artery	12-lead ECG confirmation; given if PCI not available within 90 min
Massive/submassive PE	Break down pulmonary thrombus	CT angiogram or echo confirmation
Acute arterial/DVT occlusion	Restore limb perfusion (catheter-directed)	Vascular imaging

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Signs of Bleeding

ADVERSE EFFECTS

Bleeding can occur **anywhere**. Assess systematically head-to-toe.

🟢 Minor / Early

- Oozing from IV/puncture sites
- Gum bleeding when brushing
- Small bruises (ecchymosis)
- Mild epistaxis
- Microscopic hematuria

🔴 Major / Severe

- **Frank hematuria** (visible blood in urine)
- **Melena / hematemesis** (GI bleed)
- Hemoptysis
- Retroperitoneal pain (back/flank)
- Drop in H&H, hypotension, tachycardia

🧠 INTRACRANIAL HEMORRHAGE (ICH)

Most feared complication. Watch for **sudden severe headache, change in LOC, pupillary changes, new focal weakness, seizure, vomiting, or hypertension with bradycardia (Cushing's triad)**. STOP the infusion immediately and notify provider.

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Contraindications

SCREEN BEFORE GIVING

⛔ ABSOLUTE (Never give)

- Active internal bleeding
- **Any history of hemorrhagic stroke** (ever)
- Ischemic stroke within past **3 months**
- Known intracranial neoplasm, AVM, or aneurysm
- Recent head trauma or intracranial surgery (≤3 months)
- Suspected aortic dissection
- Severe uncontrolled HTN (> **185/110**)

⚠️ RELATIVE (Use caution)

- Major surgery within 3 weeks
- Recent GI/GU bleed (≤3 weeks)
- Pregnancy or recent delivery
- Anticoagulant therapy with elevated INR
- Active peptic ulcer disease
- Age > 75 (increased ICH risk)
- Recent CPR >10 min

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Priority Nursing Interventions

ABCS + SAFETY

B BEFORE

- **Verify time** of symptom onset — confirm within therapeutic window
- Screen for contraindications (head-to-toe history)
- Establish **two large-bore IVs**
- Draw baseline labs: **CBC, PT/PTT/INR, type & screen, fibrinogen**
- Baseline VS & **neuro check (NIH Stroke Scale)**
- Confirm CT scan negative for bleed (stroke)
- Control BP <185/110 before tPA in stroke

D DURING

- **Continuous cardiac monitoring** — watch for reperfusion dysrhythmias
- VS + neuro check **every 15 minutes**
- Inspect IV sites and skin for oozing/bruising
- Watch for **allergic reaction** (especially streptokinase)
- Keep IV with normal saline patent
- No additional venipunctures or invasive procedures
- Pad side rails, fall precautions

A AFTER

- VS & neuro: **q15 min × 2 hr**, then q30 min × 6 hr, then q1 hr × 16 hr
- Monitor for bleeding × **24 hours minimum**
- Hold pressure on any puncture site **20–30 min**
- **No IM injections, arterial sticks, NG tube, or Foley** insertion for 24 hr
- No NSAIDs/aspirin unless ordered for STEMI
- Maintain BP <180/105 post-stroke tPA
- Repeat head CT in 24 hr (stroke)

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IF BLEEDING OCCURS → STOP THE INFUSION FIRST

This is the universal "first action" answer. Then notify provider, apply pressure, draw coags & H&H, prepare for **aminocaproic acid** (antidote), cryoprecipitate, FFP, or platelet transfusion as ordered.

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Pharmacology — Know Your Drugs

DRUG COMPARISON

DRUG (GENERIC / BRAND)	CLASS / MECHANISM	USE	KEY NURSING PEARL
Alteplase (Activase, tPA)	Tissue plasminogen activator — activates plasminogen directly on the clot	Ischemic stroke (#1 choice), STEMI, PE	Most common; weight-based dosing in stroke (0.9 mg/kg, max 90 mg); 10% bolus, 90% over 60 min
Reteplase (Retavase)	Recombinant tPA — longer half-life	STEMI	Given as two 10-unit IV boluses, 30 min apart — easier to administer
Tenecteplase (TNKase)	Genetically engineered tPA — most fibrin-specific	STEMI (increasingly used for stroke)	Single weight-based IV bolus over 5 sec — fastest to administer
Streptokinase	Bacterial protein — non-specific plasminogen activator	STEMI, PE (older agent, less common in US)	**High allergy/anaphylaxis risk**; do NOT re-administer within 6 months; pre-medicate if needed

💊 Side Effects (all agents)

- **Bleeding** (any site — #1 risk)
- Intracranial hemorrhage (most feared)
- Reperfusion dysrhythmias (esp. in STEMI: PVCs, V-tach, accelerated idioventricular rhythm)
- Hypotension
- Allergic reaction (streptokinase >> others)
- Angioedema (esp. on ACE inhibitors)

🧪 Antidote & Reversal

- **Aminocaproic acid (Amicar)** — antifibrinolytic; reverses thrombolytic effect
- **Cryoprecipitate** — replaces fibrinogen
- **Fresh frozen plasma (FFP)** — replaces clotting factors
- **Platelets** — if thrombocytopenic
- Tranexamic acid — alternative antifibrinolytic

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NCLEX Test Traps ⚠️

WRONG VS RIGHT

Q: Patient on tPA for stroke develops sudden severe headache and vomiting. What is the nurse's FIRST action?

WRONG ✗
Notify the provider, then continue monitoring the infusion until they call back.

RIGHT ✓
STOP the tPA infusion immediately, then notify provider and prepare for stat head CT. ICH is suspected.

Q: A patient presents with stroke symptoms. Before giving tPA, what is the priority?

WRONG ✗
Administer aspirin to start antiplatelet therapy.

RIGHT ✓
Obtain a non-contrast head CT to rule out hemorrhagic stroke. Giving tPA in a bleed is catastrophic.

Q: Which client is NOT a candidate for thrombolytic therapy?

WRONG ✗
A 58-year-old with chest pain that started 2 hours ago and a confirmed STEMI on ECG.

RIGHT ✓
A 70-year-old with stroke symptoms who had a **GI bleed two weeks ago**. Recent bleeding is a major contraindication.

Q: After tPA, which nursing intervention requires *removal* from the care plan?

WRONG ✗
Continuous cardiac monitoring and frequent neuro checks.

RIGHT ✓
Insert a Foley catheter for accurate I&O. No invasive procedures (IM, Foley, NG, arterial sticks) for 24 hours after tPA.

Q: Common confusion — Thrombolytic vs Anticoagulant vs Antiplatelet?

WRONG ✗
All three "thin the blood" the same way and are interchangeable.

RIGHT ✓
Thrombolytics DISSOLVE clots. Anticoagulants PREVENT new clot formation (heparin, warfarin). Antiplatelets PREVENT platelet aggregation (aspirin, clopidogrel).

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Patient & Family Education

TEACH BEFORE DISCHARGE

1. **Bleeding precautions × 24–48 hours**
   Use a soft-bristle toothbrush and electric razor. Avoid flossing. Report any unusual bruising, bleeding gums, blood in urine/stool, or nosebleeds that won't stop.

2. **No NSAIDs, aspirin, or herbals without approval**
   Ginkgo, garlic, ginger, ginseng, and fish oil all increase bleeding risk. Acetaminophen is the safe choice for pain.

3. **Fall prevention**
   Keep walking paths clear, use night lights, remove throw rugs. A simple fall can cause life-threatening internal bleeding while clotting factors are depleted.

4. **Recognize warning signs — BE FAST**
   Balance loss, Eye/vision changes, Face drooping, Arm weakness, Speech difficulty, Time to call 911. Recurrent stroke or new neuro change = emergency.

5. **Avoid contact sports & risky activities**
   For at least 1–2 weeks after treatment. Includes vigorous tooth brushing, dental work, and intramuscular injections unless cleared.

6. **Lifestyle modification**
   Control BP, manage diabetes, smoking cessation, heart-healthy diet, and adherence to follow-up anticoagulant/antiplatelet therapy is essential to prevent recurrence.

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Memory Mnemonics

QUICK RECALL

BLEED

- **B** Bleeding precautions × 24 hr
- **L** Labs — monitor PT/PTT/INR, H&H, fibrinogen
- **E** Examine every IV site, gums, urine, stool
- **E** Emergency for neuro change → STOP infusion
- **D** Don't delay — TIME is tissue

TIME

- **T** Three hours (up to 4.5) for stroke
- **I** Ischemic only — never hemorrhagic
- **M** Must have CT first to rule out bleed
- **E** Evaluate for contraindications

STOP

- **S** Stop the infusion immediately
- **T** Take vital signs & neuro check
- **O** Obtain labs (coags, H&H, type & cross)
- **P** Prepare antidote (aminocaproic acid)

BE FAST

- **B** Balance — sudden loss of coordination
- **E** Eyes — sudden vision changes
- **F** Face — drooping or numbness
- **A** Arm — sudden weakness or numbness
- **S** Speech — slurred, difficult, garbled
- **T** Time — call 911 immediately

PATTERN RECOGNITION

Any drug ending in "**-plase**" (alteplase, reteplase, tenecteplase) is a thrombolytic. Streptokinase is the exception — older, allergy risk, less commonly used.

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NCJMM Clinical Judgment Scenario

NGN PRACTICE

SCENARIO: A 64-year-old client arrives in the ED at **0815** with sudden onset right-sided weakness and slurred speech that began at **0700** (1 hour 15 min ago). PMH: HTN, type 2 DM, atrial fibrillation on warfarin. Current vitals: BP 172/96, HR 92 irregular, RR 18, SpO_2 96% on RA. Glucose 124 mg/dL. **NIH Stroke Scale: 14.** Non-contrast head CT shows *no hemorrhage*. INR 1.6. The provider is considering IV alteplase.

STEP 1

Recognize Cues

Sudden focal neuro deficit + last-known-well 1 hr 15 min ago + CT negative for bleed = **likely acute ischemic stroke**. BP elevated. **INR 1.6 on warfarin** — caution flag.

STEP 2

Analyze Cues

Within 4.5-hr window ✓. CT negative ✓. BP <185/110 ✓. **INR < 1.7 is acceptable** per AHA — but borderline. Age, HTN, and a-fib increase risk and benefit.

STEP 3

Prioritize Hypotheses

#1 Acute ischemic stroke needing reperfusion. #2 Risk of hemorrhagic conversion post-tPA. #3 Hypertensive emergency. **Reperfusion is the priority** — time-critical.

STEP 4

Generate Solutions

Verify tPA candidacy with team. Two large-bore IVs. Baseline labs. Lower BP if needed with labetalol. Position HOB 30°. Prep for tPA bolus + 60-min infusion.

STEP 5

Take Action

Administer alteplase 0.9 mg/kg (10% bolus, 90% over 60 min). NPO. VS + neuro **q15 min × 2 hr**. No IM injections, Foley, or NG. Keep BP <180/105.

STEP 6

Evaluate Outcomes

Expected: NIHSS improvement, BP controlled, no bleeding, no neuro decline. **Unexpected: sudden HA, vomiting, decreased LOC, new HTN with bradycardia** → STOP infusion, stat head CT, prepare reversal.