

NEUROLOGICAL SYSTEM

Ischemic Stroke

"Time is Brain" — 1.9 million neurons die every minute without treatment

 **Source Note:** This topic was not included in the uploaded reference notes for this session. Content is drawn from standard NGN NCLEX 2026 references: **Saunders Comprehensive Review, ATI Medical-Surgical, Lippincott NCLEX-RN, AHA/ASA Stroke Guidelines (2025 update), and CDC stroke prevention data.**



Definition & Overview

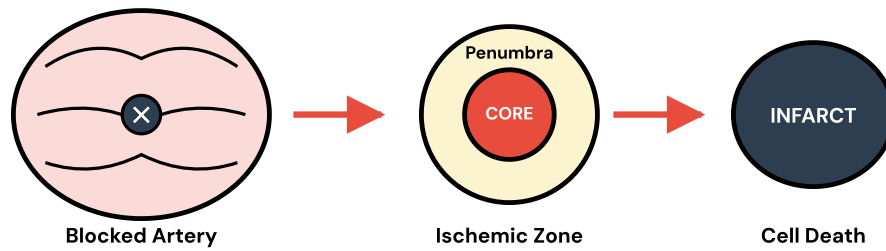
What it is and why it matters

- ▶ **Ischemic stroke** = sudden loss of brain function caused by interruption of cerebral blood flow from a **thrombus** (clot forms in artery) or **embolus** (clot travels — often from atrial fibrillation).
- ▶ Accounts for **~87% of all strokes**. The remaining 13% are hemorrhagic (bleed).
- ▶ **Medical emergency** — irreversible brain damage begins within minutes. Goal: restore perfusion to the **ischemic penumbra** (salvageable tissue) before infarction is complete.
- ▶ Major modifiable risk factors: **HTN, atrial fibrillation, diabetes, hyperlipidemia, smoking, obesity, sedentary lifestyle.**

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Pathophysiology

The cascade — simplified



1 **Atherosclerosis or embolus** blocks a cerebral artery (most often the middle cerebral artery — MCA).

2 **Blood flow stops** → brain tissue is deprived of oxygen and glucose.

3 **Cellular energy failure** → sodium-potassium pump fails → cells swell.

4 **Ischemic penumbra** forms around the core (this tissue is still salvageable if reperfused quickly).

5 Without reperfusion → **infarction** (permanent neuronal death) + **cerebral edema** → increased ICP.



Signs & Symptoms

Early recognition saves brain tissue



Early / Classic (BE FAST)

- ▶ **Balance** loss, sudden dizziness
- ▶ **Eyes** — vision loss in one or both eyes
- ▶ **Face** drooping (unilateral)
- ▶ **Arm** weakness or pronator drift
- ▶ **Speech** — slurred (dysarthria) or aphasia
- ▶ **Time** — call 911 immediately
- ▶ Sudden numbness, especially one-sided
- ▶ **Dysphagia** (HIGH aspiration risk)



Late / Severe

- ▶ Decreased level of consciousness
- ▶ Pupillary changes (unequal, sluggish)
- ▶ Seizures
- ▶ Posturing (decorticate, decerebrate)
- ▶ Cushing's triad: ↑BP, ↓HR, irregular respirations
- ▶ Hemiparesis → hemiplegia
- ▶ Incontinence



RED FLAG FINDINGS

- SUDDEN** onset of focal deficit **UNILATERAL** facial droop + arm drift + slurred speech (classic triad)
- DYSPHAGIA** — NPO until swallow eval cleared **CUSHING'S** triad indicates impending herniation
- WORST HEADACHE** of life — suggests hemorrhagic instead (still call rapid response)



LEFT Brain Stroke → RIGHT-side weakness

- Aphasia (Broca's = expressive, Wernicke's = receptive)
- Slow, cautious behavior
- Right visual field deficit
- Difficulty with math, reading, writing
- Right-sided hemiparesis/hemiplegia



RIGHT Brain Stroke → LEFT-side weakness

- Impulsive behavior, poor judgment
- Spatial-perceptual deficits
- Left neglect (ignores left side)
- Denial of deficit (anosognosia)
- Left-sided hemiparesis/hemiplegia

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Priority Nursing Interventions

ABC framework + time-sensitive actions

A AIRWAY

- ▶ **Assess swallow before ANYTHING PO** — keep NPO until cleared by SLP
- ▶ Position upright during feeding once cleared
- ▶ Suction available at bedside

B BREATHING

- ▶ Monitor SpO₂ — keep ≥94%
- ▶ Watch for aspiration signs
- ▶ HOB elevated 30° (improves venous drainage, reduces ICP)

C CIRCULATION

- ▶ **Permissive HTN** — do NOT aggressively lower BP
- ▶ If receiving tPA: BP must be <185/110
- ▶ If NOT receiving tPA: tolerate up to 220/120
- ▶ Establish 2 large-bore IVs

⌚ TIME-CRITICAL

- ▶ **Establish "last known well" time**
- ▶ **STAT non-contrast CT** — rule out hemorrhage before tPA
- ▶ NIH Stroke Scale (NIHSS)
- ▶ Blood glucose (hypoglycemia mimics stroke)
- ▶ Neuro checks q1h or per protocol

🎯 Additional Priority Actions

- ▶ **Fall precautions** — bed in low position, call light in reach (unaffected side)
- ▶ Affected limb — support with pillows; range-of-motion to prevent contractures
- ▶ Approach patient from **unaffected side** (or affected side for neglect rehab — per stage)
- ▶ Place items within reach on the **unaffected side**
- ▶ Communication board for aphasia; allow time to respond
- ▶ Skin assessment and turning q2h to prevent breakdown
- ▶ DVT prevention: SCDs, early mobilization, anticoagulation when appropriate

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Pharmacology

Key medications and nursing considerations

Drug / Class	Mechanism	Key Side Effects	Nursing Considerations
Alteplase (tPA) <i>Thrombolytic</i>	Activates plasminogen → dissolves the clot	 BLEEDING (intracranial, GI, GU); angioedema	Window: 3–4.5 hrs from onset. BP must be <185/110. CT must rule out bleed. 2 large-bore IVs. NO anticoagulants/antiplatelets x 24 hrs. Monitor neuro q15min x 2hr.
Aspirin <i>Antiplatelet</i>	Blocks COX-1 → ↓ platelet aggregation	GI bleeding, tinnitus, bruising	Give within 24–48 hrs after stroke (NOT within 24 hrs of tPA). Give with food. Monitor for bleeding.
Clopidogrel (Plavix)	Inhibits ADP receptor → ↓ platelet aggregation	Bleeding, bruising, TTP (rare)	Often used with aspirin (dual antiplatelet). Hold before surgery per protocol.
Heparin / LMWH <i>Anticoagulant</i>	Potentiates antithrombin III → blocks thrombin	Bleeding, HIT (heparin-induced thrombocytopenia)	Monitor aPTT (heparin) or anti-Xa (LMWH). Platelet count. Antidote = protamine sulfate .
Warfarin (Coumadin)	Vitamin K antagonist	Bleeding, skin necrosis	Used for afib-related stroke prevention. Monitor INR (goal 2–3). Antidote = vitamin K . Avoid green leafy veg increases.
DOACs (apixaban, rivaroxaban, dabigatran)	Direct factor Xa or thrombin inhibitors	Bleeding (less monitoring needed)	Preferred over warfarin in many afib patients. Dabigatran antidote = idarucizumab ; Xa inhibitors = andexanet alfa .
Statins (atorvastatin)	HMG-CoA reductase inhibitor	Myalgia, ↑ liver enzymes, rhabdomyolysis	Secondary prevention. Monitor LFTs and CK. Report muscle pain.
Antihypertensives (labetalol, nicardipine)	Lower BP carefully	Bradycardia, hypotension	Used IV in acute stroke when BP exceeds tPA or post-stroke thresholds. Titrate per parameters.



NCLEX Test Traps

Where students lose points

~~✗ Lower BP aggressively in acute stroke~~

✓ Permissive HTN — only treat if >185/110 (tPA) or >220/120 (no tPA). High BP maintains perfusion to the penumbra.

~~✗ Give tPA before CT scan~~

✓ Non-contrast CT FIRST to rule out hemorrhage. tPA in hemorrhagic stroke = catastrophic bleeding.

~~✗ Offer water as soon as patient seems alert~~

✓ NPO until swallow screen/evaluation passes — dysphagia is silent and high-risk.

~~✗ Place call light on the affected side~~

✓ Place essentials on the unaffected side initially. Approach from unaffected side to reduce startle and injury.

~~✗ Right brain stroke → right side weakness~~

✓ Stroke causes contralateral deficits — right brain → LEFT weakness; left brain → RIGHT weakness + aphasia.

~~✗ Give heparin or aspirin during tPA infusion~~

✓ No anticoagulants/antiplatelets x 24 hrs after tPA — bleed risk multiplies.

~~✗ Hypoglycemia? "Looks like a stroke" — call code stroke~~

✓ Always check blood glucose — hypoglycemia mimics stroke and is rapidly reversible. Treat hypoglycemia first.

~~✗ tPA window is always 3 hours~~

✓ Standard window is 3 hrs from "last known well"; extended to 4.5 hrs for select patients; mechanical thrombectomy up to 24 hrs in select cases.



Patient & Family Education

Prevention and home management

- ▶ **Recognize BE FAST signs** — Balance, Eyes, Face, Arms, Speech, Time → call 911 immediately, never drive yourself.
- ▶ **Control modifiable risk factors:** manage HTN (<130/80), DM (A1C <7%), cholesterol, weight.
- ▶ **Smoking cessation** — doubles stroke risk; quitting drops risk within 5 years.
- ▶ **Heart-healthy diet:** DASH or Mediterranean — low sodium (<2300 mg/day), low saturated fat, high fruits/veggies/whole grains.
- ▶ **Atrial fibrillation:** take anticoagulant exactly as prescribed — never skip doses. Wear medical alert ID. Avoid contact sports/high fall risk activities.
- ▶ **Bleeding precautions on anticoagulants:** soft toothbrush, electric razor, no NSAIDs without provider approval, report black/tarry stools, bruising, headache.
- ▶ **Rehab is essential** — PT, OT, speech therapy. Set realistic goals; recovery continues for 6–12+ months.
- ▶ **Aspiration precautions at home:** sit upright for meals, small bites, thickened liquids if ordered, no straws if dysphagia.
- ▶ **Fall prevention:** remove throw rugs, install grab bars, use assistive devices as prescribed.
- ▶ **Emotional support:** depression and emotional lability are common post-stroke; seek counseling/support groups.
- ▶ **Follow-up appointments** with neurology, primary care, and cardiology (if afib) — never skip.



Memory Mnemonics & Quick Recall

High-yield patterns

★ BE FAST — Stroke Recognition

B
BALANCE

E
EYES

F
FACE

A
ARMS

S
SPEECH

T
TIME

Balance loss · **Eye** changes · **Face** droop · **Arm** drift · **Speech** slurred · **Time** to call 911

★ "Time is Brain"

Every minute without treatment = **1.9 million neurons lost**. Door-to-needle goal for tPA is **<60 minutes**.

★ Side of Brain → Opposite Side of Body

Left brain = Language (aphasia) + right body weakness

Right brain = Reckless behavior + spatial neglect + left body weakness

★ "Stroke 5 Cs" — Modifiable Risks

Cholesterol · Cigarettes · Carbohydrates (DM) · Compression (HTN) · Clots (afib)

★ tPA Contraindications — "BLEEDING"

Bleeding active anywhere

Last known well >4.5 hrs

Elevated BP >185/110

Endocarditis or aortic dissection

Diabetes with history of stroke (relative)

Intracranial hemorrhage on CT

Neurosurgery or major surgery <14 days

GI/GU bleed <21 days



NCJMM Clinical Judgment Scenario

Next Generation Clinical Judgment Measurement Model — 6 Steps

SCENARIO: A **68-year-old male** is brought to the ED by his wife. She reports he was watching TV when he suddenly "couldn't get his words out" and his right arm went limp. **Last known well: 1 hour ago.**

PMH: HTN, atrial fibrillation (not currently on anticoagulant — "couldn't afford it"), Type 2 DM

VS: BP 178/96, HR 92 irregular, RR 18, SpO₂ 96% RA, T 98.6°F

Assessment: Right facial droop, right arm drift, dysarthria, A&O x 2, glucose 142 mg/dL

NIHSS: 12

STEP 1

Recognize Cues

- ▶ Sudden onset of right-sided weakness + dysarthria
- ▶ Right facial droop, right arm drift (left-brain involvement)
- ▶ History of atrial fibrillation — NOT anticoagulated (embolic source)
- ▶ Symptom onset within tPA window (1 hour)
- ▶ BP elevated but below 185/110 threshold
- ▶ Glucose normal — not hypoglycemia mimic

STEP 2

Analyze Cues

- ▶ Cluster of findings = **acute left-hemisphere ischemic stroke** (likely MCA territory)
- ▶ A-fib is the probable embolic source
- ▶ Within 4.5-hour tPA window
- ▶ BP currently safe for tPA; glucose ruled out as mimic
- ▶ NIHSS 12 = moderate stroke; benefits of tPA likely outweigh risks

STEP 3

Prioritize Hypotheses

- ▶ **#1 PRIORITY:** Acute ischemic stroke — left MCA
- ▶ **#2:** Must rule out hemorrhagic stroke via non-contrast CT before tPA

- ▶ **#3:** Aspiration risk from dysphagia — NPO status
- ▶ **#4:** Recurrence risk from untreated afib — long-term anticoagulation needed

STEP 4



Generate Solutions

- ▶ STAT non-contrast CT head to rule out hemorrhage
- ▶ Establish 2 large-bore peripheral IVs
- ▶ Strict NPO; suction at bedside
- ▶ Continuous cardiac monitoring + pulse ox
- ▶ Q15min neuro + BP monitoring
- ▶ Hold all antiplatelets/anticoagulants pending tPA decision
- ▶ Prepare alteplase per weight-based protocol
- ▶ Notify stroke team / activate code stroke

STEP 5



Take Action

- ▶ Transport for CT immediately — door-to-CT goal <25 min
- ▶ Confirm CT shows no hemorrhage → proceed with tPA
- ▶ Verify BP <185/110 immediately before bolus
- ▶ Administer alteplase: 10% as IV bolus over 1 min, remaining 90% over 60 min
- ▶ Monitor BP q15min x 2 hrs, then q30min x 6 hrs, then q1h x 16 hrs
- ▶ Neuro checks at same intervals
- ▶ No anticoagulants, antiplatelets, NG tube, foley, or arterial sticks x 24 hrs

STEP 6



Evaluate Outcomes

- ▶ **Expected (positive):** NIHSS score improves; speech and motor function return; BP remains <185/110; no signs of bleeding
- ▶ **Monitor for complications:** sudden severe headache, decreased LOC, new-onset hypertension, vomiting — could indicate intracranial bleed → STAT CT, stop tPA if still infusing
- ▶ **Bleeding signs:** oozing IV/gum sites, hematuria, melena, ecchymosis — notify provider

- ▶ **Swallow eval** passed before any PO intake
- ▶ **Long-term:** initiate anticoagulation for afib at appropriate post-stroke interval; schedule rehab; secondary prevention teaching

Diane's NGN NCLEX 2026 Visual Study Library · Ischemic Stroke · Neurological System
For educational review only. Always defer to current institutional protocols and provider orders.