DIANE'S NGN NCLEX 2026 STUDY SERIES

The *Anemias*

Hematologic system · A complete reference covering iron-deficiency, B12/pernicious, folate, aplastic, sickle cell, and chronic disease anemias — with complications, management, diet, nursing care, and patient teaching.

HEMATOLOGY

HIGH YIELD

NCJMM ALIGNED

1

FOUNDATION

Definition & Overview

Anemia is a reduction in the total number of circulating red blood cells (RBCs), the amount of hemoglobin (Hgb), or the hematocrit (Hct) — resulting in **decreased oxygen-carrying capacity** of the blood.

It is not a disease but a **sign of an underlying disorder**. Tissues become hypoxic, the heart works harder to compensate, and every body system is affected.

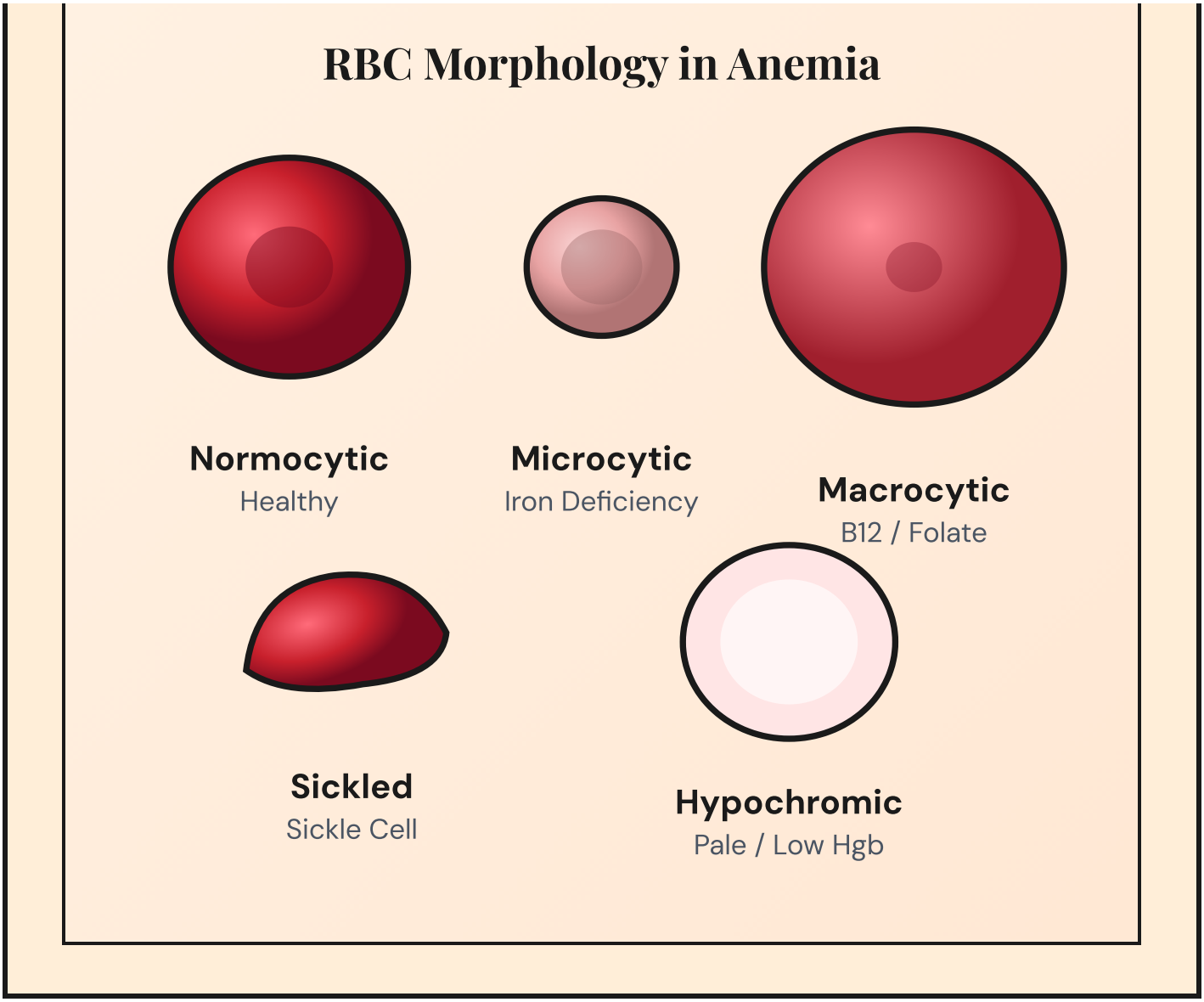
Severity is judged by hemoglobin level, speed of onset, and the patient's ability to compensate — chronic anemia tolerates lower numbers than acute blood loss.

<12 / <14
HGB ANEMIA THRESHOLD (WOMEN / MEN, G/DL)

<7
CRITICAL HGB — TRANSFUSION TYPICALLY INDICATED

36–46%
NORMAL HCT (WOMEN); 41–53% (MEN)

120 days
NORMAL RBC LIFESPAN


RBC Morphology in Anemia
Normocytic
Healthy
Microcytic
Iron Deficiency
Macrocytic
B12 / Folate
Sickled
Sickle Cell
Hypochromic
Pale / Low Hgb

2

CLASSIFICATION

The Six Major Anemias

MICROCYTIC · HYPOCHROMIC

Iron-Deficiency Anemia

↓ IRON STORES

#1 most common anemia worldwide. Caused by chronic blood loss (GI bleed, heavy menses), poor intake, malabsorption, or pregnancy. **Labs:** ↓ Hgb, ↓ MCV, ↓ ferritin, ↓ serum iron, ↑ TIBC. Tongue may appear smooth/red (glossitis); spoon-shaped nails (koilonychia); pica (craving ice, dirt, starch).

MACROCYTIC · MEGALOBLASTIC

B12 / Pernicious Anemia

↓ INTRINSIC FACTOR

Loss of intrinsic factor from gastric parietal cells → cannot absorb B12 in the ileum. Common after gastric bypass or in strict vegans. **Hallmark: neurologic findings** — paresthesias, ataxia, beefy red tongue, confusion. **Schilling test** diagnoses. Treated with **lifelong IM B12 (cyanocobalamin)** — never oral if no intrinsic factor.

MACROCYTIC · MEGALOBLASTIC

Folic Acid Deficiency

↓ FOLATE INTAKE

Causes: alcoholism, malnutrition, pregnancy, malabsorption, methotrexate/phenytoin. **Looks like B12 anemia BUT no neuro symptoms** — that's the key differentiator. Critical in pregnancy: deficiency causes **neural tube defects**. Treat with oral folic acid 1 mg/day.

PANCYTOPENIA · BONE MARROW

Aplastic Anemia

BONE MARROW FAILURE

All three cell lines drop (RBC, WBC, platelets). Causes: idiopathic, radiation, chemo, benzene, chloramphenicol, hepatitis. **Triad:** anemia + infection (low WBC) + bleeding (low platelets). **Treatment:** remove cause, transfusions, immunosuppression, bone marrow transplant. **Reverse isolation** required.

HEMOLYTIC · INHERITED

Sickle Cell Anemia

HBS GENE MUTATION

Autosomal recessive. Abnormal Hgb S sickles under hypoxia, dehydration, cold, stress, infection → vaso-occlusive crisis. **Hallmark = severe pain** (joints, chest, abdomen). Risks: stroke, acute chest syndrome, splenic sequestration, priapism. **Hydroxyurea** ↑ fetal Hgb. Hydration + oxygen + pain control + warmth.

NORMOCYTIC · SECONDARY

Anemia of Chronic Disease

INFLAMMATION / CKD

Seen in CKD, cancer, chronic infection, autoimmune disease. In CKD, the kidneys make less **erythropoietin (EPO)** → poor RBC production. Treat with **epoetin alfa (Epogen, Procrit)** + iron supplementation. Treat the underlying disease. Watch for hypertension and thrombosis with EPO therapy.

3

PATHOPHYSIOLOGY

How Anemia Hurts the Body

1

Trigger

Blood loss, poor production, or RBC destruction

↓

2

↓ Hgb / RBC

Less oxygen-carrying capacity in circulation

↓

3

Tissue Hypoxia

Cells starve for O_2 — fatigue, pallor, weakness

↓

4

Compensation

Heart pumps faster & harder; ↑ HR, ↑ RR, murmur

↓

5

Decompensation

HF, angina, syncope, organ failure if untreated

4

CLINICAL MANIFESTATIONS

Signs & Symptoms

⚠ Early / Mild

- **Fatigue, weakness** — most common, often the first complaint
- **Pallor** of skin, conjunctiva, nail beds, palms
- Mild dyspnea on exertion
- Headache, dizziness, lightheadedness
- Cold intolerance, cool extremities
- Tachycardia (compensatory)
- Pica (iron deficiency — craving ice, dirt, starch)

! Late / Severe

- 🚨 **Chest pain / angina** — heart not getting enough O_2
- 🚨 **Severe dyspnea at rest**, orthopnea
- 🚨 **Heart failure signs** — S3, JVD, edema, crackles
- **Glossitis** (smooth, beefy red, painful tongue) — B12, iron, folate
- **Neurologic changes** — paresthesias, ataxia, confusion (B12 only)
- Spoon nails (koilonychia), brittle hair (iron def)
- Jaundice (hemolytic types — sickle cell)
- Severe pain crisis (sickle cell)

🚨 **RED FLAGS** Chest pain · Severe dyspnea · Confusion · Hgb < 7 g/dL · Active bleeding · Sickle cell pain crisis with chest pain or fever — call provider, prepare for transfusion or emergency intervention.

5

PRIORITY NURSING CARE

Interventions — ABC Framework

A

Airway & Oxygenation

- Apply O_2 for SpO_2 < 92% or symptomatic dyspnea
- Position semi-Fowler's to maximize lung expansion
- Pulse ox continuously if Hgb < 8 g/dL
- Monitor RR, lung sounds, work of breathing

B

Breathing & Circulation

- Monitor HR, BP, capillary refill
- Assess for orthostatic hypotension before ambulating
- Watch for signs of HF (crackles, JVD, edema)
- Daily weights; strict I&O if HF risk

C

Conservation & Safety

- **Energy conservation** — cluster care, frequent rest
- Fall precautions — bed low, call light, assist to ambulate
- Reverse isolation if neutropenic (aplastic, post-chemo)
- Bleeding precautions if low platelets

General Nursing Priorities Across All Anemias

1. Monitor CBC, Hgb, Hct, reticulocyte count, iron studies
2. Administer ordered iron, B12, folate, or EPO as prescribed
3. Type & cross-match and prepare for transfusion if Hgb < 7 g/dL
4. Provide a high-protein, high-iron, high-vitamin diet

5. Pace activities — alternate rest with activity
6. Assess for bleeding (stool, urine, gums, bruising)
7. Oral hygiene with soft brush — glossitis is painful
8. Teach the cause and the lifelong nature of some types (B12, sickle)

6

MEDICATIONS

Pharmacology

DRUG / CLASS	MECHANISM	SIDE EFFECTS	NURSING CONSIDERATIONS
Ferrous Sulfate ORAL IRON · IRON-DEFICIENCY	Replaces depleted iron stores; supports Hgb synthesis.	Constipation, nausea, **black tarry stools (expected)**, GI upset, tooth staining (liquid).	Give **between meals** for best absorption; with **vitamin C / OJ**; avoid milk/antacids/tea. Use **straw** for liquid. Stool color change is normal.
Iron Dextran / Sucrose PARENTERAL IRON · IM/IV	Delivers iron when oral cannot be tolerated or absorbed.	**Anaphylaxis**, hypotension, staining of skin (IM).	Use **Z-track method** for IM. Test dose first. Have epi available. Do NOT massage site.
Cyanocobalamin (B12) VITAMIN B12 · PERNICIOUS	Replaces B12; required for RBC maturation and myelin.	Hypokalemia (early therapy), itching, pain at injection site.	**Lifelong IM monthly** for pernicious anemia. Oral useless without intrinsic factor. Monitor K^+ during initial therapy.
Folic Acid VITAMIN · FOLATE ANEMIA	Replaces folate for DNA synthesis and RBC maturation.	Generally well-tolerated; rare allergic reaction.	Critical in pregnancy to prevent neural tube defects. Does NOT correct B12 neuro symptoms — must rule out B12 deficiency first.
Epoetin Alfa EPOGEN / PROCRIT · CKD	Synthetic erythropoietin — stimulates bone marrow RBC production.	**HTN, thrombosis, MI, stroke**, headache, seizure.	Monitor BP and Hgb closely. **Hold if Hgb > 11 g/dL** (cardiovascular risk). Ensure iron stores adequate.
Hydroxyurea ANTINEOPLASTIC · SICKLE CELL	Increases **fetal hemoglobin (HbF)** — reduces sickling and crises.	Bone marrow suppression, GI upset, skin changes, **teratogenic**.	Monitor CBC frequently. Pregnancy category D — contraception required. Reduces frequency of pain crises.

DRUG / CLASS	MECHANISM	SIDE EFFECTS	NURSING CONSIDERATIONS
Packed RBCs BLOOD PRODUCT · SEVERE ANEMIA	Directly replaces RBCs and oxygen-carrying capacity.	Hemolytic, febrile, allergic reactions; circulatory overload; iron overload (chronic).	2 nurse check; **0.9% NS only**; 18-gauge IV; vitals at 15 min; complete within 4 hours; stop transfusion at first sign of reaction.

7

EXAM STRATEGY

NCLEX Test Traps ⚠️

✗ COMMON MISTAKE

Giving B12 **orally** to a patient with pernicious anemia.

✓ CORRECT ANSWER

Pernicious anemia lacks intrinsic factor — B12 must be given **IM (or intranasal)** for life.

✗ COMMON MISTAKE

Telling a patient on iron that **black stools mean GI bleeding**.

✓ CORRECT ANSWER

Black, tarry stools are an **expected effect** of oral iron — reassure the patient. Bleeding stools have a different presentation (foul, sticky, with other bleeding signs).

✗ COMMON MISTAKE

Encouraging **ambulation and exercise** for a sickle cell patient in crisis.

✓ CORRECT ANSWER

During crisis: **rest, hydration, oxygen, warmth, and pain control** (often IV opioids). Activity worsens sickling.

✗ COMMON MISTAKE

Assuming folate replacement **fixes everything** in megaloblastic anemia.

✓ CORRECT ANSWER

Folate corrects the anemia but **masks B12 deficiency** — neuro damage progresses. Always check B12 first.

✗ COMMON MISTAKE

Giving Epogen until Hgb is "normal" (12–14 g/dL).

✓ CORRECT ANSWER

Hold Epogen when Hgb > 11 g/dL — overshooting causes HTN, stroke, MI, and clotting.

✗ COMMON MISTAKE

Putting an aplastic anemia or post-chemo patient in a **regular room with visitors**.

✓ CORRECT ANSWER

Pancytopenia → **reverse (protective) isolation**; no fresh flowers, no raw fruit/veg, screen visitors for illness.

✗ COMMON MISTAKE

Iron with milk to reduce stomach upset.

✓ CORRECT ANSWER

Calcium/dairy **blocks iron absorption**. Take with **vitamin C / OJ**; if GI upset, take with food but avoid dairy and antacids.

✗ COMMON MISTAKE

Cooling a sickle cell patient because they "look flushed."

✓ CORRECT ANSWER

Cold causes **vasoconstriction → more sickling**. Keep the patient **warm**; never apply cold packs to a crisis patient.

8

NUTRITIONAL THERAPY

Diet by Anemia Type

Iron-Rich Foods

IRON-DEFICIENCY ANEMIA

Red meat, liver	Egg yolks
Dark leafy greens	Spinach, kale
Beans, lentils	Fortified cereals
Dried fruit (raisins)	Tofu, blackstrap molasses

Pair with vitamin C (oranges, strawberries, peppers, tomatoes) to ↑ absorption. Avoid coffee, tea, dairy with iron.

B12-Rich Foods

PERNICIOUS / B12 ANEMIA

Meat, organ meat	Fish, shellfish
Poultry	Eggs
Dairy products	Fortified cereals
Fortified plant milks	Nutritional yeast

Strict vegans need supplements. Diet alone won't help true pernicious anemia (no intrinsic factor) — IM B12 required.

Folate-Rich Foods

FOLIC ACID DEFICIENCY

Leafy greens	Asparagus, broccoli
Beans, peas	Lentils
Citrus fruits	Avocado
Fortified cereals/breads	Liver, eggs

Cooking destroys folate. Eat fresh/raw when possible. **All women of childbearing age** should take 400 mcg folic acid daily.

9

TEACHING POINTS

Patient & Family Education

Iron-Deficiency Anemia

- Take iron **between meals with vitamin C** (orange juice) for best absorption
- **Do NOT take with milk, antacids, coffee, tea** — they block absorption
- Use a **straw** with liquid iron; rinse mouth to prevent tooth staining
- Stools will turn **black/tarry** — this is expected, not bleeding
- Increase fiber + fluids to prevent constipation
- Continue iron 3–6 months **after** Hgb normalizes to rebuild stores

Pernicious / B12 Anemia

- This requires **monthly IM B12 injections for life**
- Stopping treatment can cause **permanent nerve damage**
- Report tingling, numbness, or balance changes immediately
- Use safety measures — fall risk from neuropathy
- Eat soft, bland foods if tongue is sore (glossitis)
- Genetic component — family members may need screening

Folate-Deficiency Anemia

- Increase folate-rich foods — avoid overcooking (heat destroys folate)
- If pregnant or planning pregnancy: **folic acid supplement is essential**
- Avoid alcohol — it interferes with folate absorption and use
- Tell provider about all medications — methotrexate, phenytoin, sulfa drugs deplete folate
- Don't self-treat with folate alone if B12 status is unknown

Sickle Cell Anemia

- **Avoid triggers:** dehydration, cold, high altitude, infection, stress, smoking, alcohol
- Drink at least **3–4 L of fluids daily** to prevent crisis
- Get the **flu, pneumonia, and meningococcal vaccines**

- Recognize crisis: severe pain, chest pain, fever, swelling — go to ER
- Genetic counseling — autosomal recessive trait inheritance
- Wear a Medic Alert bracelet

Aplastic Anemia

- Practice **strict infection precautions** — handwashing, avoid crowds & sick people
- Avoid raw fruits, vegetables, fresh flowers, and undercooked meat
- Use a **soft toothbrush, electric razor**; avoid flossing if platelets low
- Report fever > 100.4°F (38°C) immediately — emergency
- No NSAIDs or aspirin — increases bleeding risk
- Identify and avoid the offending agent (drugs, chemicals, radiation)

Anemia of Chronic Disease (CKD)

- **Epogen/Procrit** may be given by injection — learn self-injection technique
- Check BP at home — report HTN to provider
- Report headaches, chest pain, leg swelling, calf pain immediately
- Take iron supplements as prescribed alongside EPO
- Goal Hgb is 10–11 g/dL — **not** "normal"; higher levels increase risk
- Treat the underlying disease (CKD, cancer, autoimmune) for best response

10

MEMORY ANCHORS

Mnemonics & Pattern Recognition

PALLOR

SYMPTOMS OF ANEMIA

- **P** **P**allor of skin and conjunctiva
- **A** **A**norexia, anxiety
- **L** **L**ethargy, fatigue
- **L** **L**ow exercise tolerance
- **O** **O**nset of dyspnea
- **R** **R**apid pulse (tachycardia)

HOP

SICKLE CELL CRISIS TRIGGERS

- **H** **H**ypoxia, **H**igh altitude, dehydration
- **O** **O**verexertion, infection (sepsis)
- **P** **P**regnancy, cold exposure, stress

Sickle Cell Crisis Care = HOP into action: **H**ydration · **O**xygen · **P**ain control. Plus warmth and rest.

B12 = NEURO

B12 VS FOLATE DIFFERENTIATOR

Both cause **macrocytic** anemia and look identical on labs. The **only** way to tell them apart clinically:

B12 deficiency = NEURO symptoms
(paresthesia, ataxia, confusion, beefy red tongue)

Folate deficiency = NO neuro symptoms
(just the macrocytic anemia + glossitis)

"C" PLUS IRON

IRON ABSORPTION RULES

- ✓ Vitamin **C** (OJ) **boosts** iron absorption
- ✓ Empty stomach is **best**; meals if GI upset
- ✗ Avoid **milk, antacids, tea, coffee**
- ✗ Use a **straw** for liquid iron — stains teeth

Black stools = expected. Tell the patient before they panic.

11 · NCJMM Clinical Judgment Scenario

The NCSBN Clinical Judgment Measurement Model — the framework behind every Next-Gen NCLEX item — applied to a real anemia case.

PATIENT SCENARIO

A **72-year-old female** *presents to the ED. Vital signs:* **HR 122**, **BP 92/58**, **RR 26**, **SpO_2 90% on room air**, *T 99.1°F. She reports* **fatigue, dyspnea on exertion, and dark/tarry stools for one week**. *Skin is* **pale**, *conjunctivae are* **blanched**, *and she has* **cool extremities**. *Labs:* **Hgb 6.4 g/dL**, *Hct 19%, MCV 72 fL, ferritin 6 ng/mL.*

1

Recognize Cues

Tachycardia, hypotension, tachypnea, low SpO_2, severe pallor, cool skin, **Hgb 6.4**, microcytic indices, melena, ferritin critically low.

2

Analyze Cues

Microcytic anemia + GI bleed + symptomatic compensation. **Severe iron-deficiency anemia from chronic GI loss** — at risk of decompensation.

3

Prioritize Hypotheses

Highest priority: tissue hypoxia + hemodynamic instability. Source of bleed must be identified. Risk of MI, syncope, falls.

4

Generate Solutions

O_2 via NC, IV access × 2 (18-gauge), type & cross for **PRBC transfusion**, NS bolus, NPO, GI consult, monitor for HF.

5

Take Action

Apply O_2 → IV access → draw labs → start **0.9% NS** → administer first PRBC unit per protocol → continuous cardiac monitoring → keep NPO.

6

Evaluate Outcomes

After 1 unit PRBC: Hgb ↑ to 7.8, HR 96, BP 108/68, SpO_2 96%. **Improved oxygenation and perfusion** — continue plan, await scope.

Anemias · NGN NCLEX 2026

DIANE'S STUDY SERIES · HEMATOLOGY · CLINICAL JUDGMENT INTEGRATED