

ANAEMIA

ANAEMIA AFFECTS ~ONE-THIRD OF THE WORLD'S POPULATION

MOST COMMON CAUSES IN THE DEVELOPED WORLD ARE IRON DEFICIENCY, THALASSAEMIA AND ANAEMIA OF CHRONIC DISEASE

PATHOPHYSIOLOGY:

- Anaemia is defined as a REDUCED CONCENTRATION OF RED BLOOD CELLS FROM AN INDIVIDUAL'S BASELINE LEVEL
- The average life span of the circulating erythrocyte is ~120 days
- Any processor conditions that IMPAIRS PRODUCTION, INCREASES THE RATE OF DESTRUCTION OR INCREASES THE LOSS OF ERYTHROCYTES FROM THE BODY WILL RESULT IN ANAEMIA IF THE BODY CANNOT PRODUCE ENOUGH NEW CELLS TO KEEP UP
- There are FOUR MAIN CATEGORIES OF ANAEMIA:

Table 226-2 Classification of Anemia	
Mechanism	Example
Loss of red blood cells by hemorrhage	Acute GI bleeding
Increased destruction	Sickle cell disease
	Drug-induced autoimmune hemolytic anemia
Impaired production	Nutritional deficiency anemia (iron, folate)
	Aplastic or myelodysplastic anemia
Dilutional	Rapid IV crystalloid infusion

- COMPENSATORY MECHANISMS:
 - ACUTE ANAEMIA:
 - If there is loss of intravascular volume, PERIPHERAL VASOCONSTRICTION AND CENTRAL VASODILATION will help preserve blood flow to vital organs
 - Leads to decreased SVR, ↑d CO, ↑HR
 - RBC also enhance their ability to release oxygen to tissues
 - Anaemia will also result in stimulation of EPO that should stimulate new RBC production and new reticulocytes should appear within the blood in 3-7 days

CLINICAL FEATURES:

- Regardless of the cause, many of the clinical manifestations of anaemia are the same
- Severity of symptoms relate to:
 - Rate of development
 - Extent of anaemia
 - Age

- General physical condition and other exiting comorbidities
- Common complaints:
 - Weakness
 - Fatigue
 - SOB/OE
 - Palpitations
 - Orthostatic symptoms
- Signs:
 - Tachycardia
 - Mucosal, skin and nail bed pallor
 - Systolic ejection murmur
 - Bounding pulse
 - Widened pulse pressure
 - Evidence of jaundice and hepatosplenomegaly suggest HAEMOLYSIS



Conjunctival pallor (left), palmar pallor (right, alongside normal for comparison)

- In those who develop acute, severe anaemia will also have hypotension, SOB at rest, diaphoresis, anxiety, altered mental state

DIAGNOSIS:

- Diagnosis is established by finding a DECREASED RBC COUNT, HAEMOGLOBIN AND HAEMATOCRIT
- It is rarely essential to find a specific cause of anaemia in ED, but the work-up can be started to expedite a diagnosis
- MCV is the most useful guide
- Reticulocyte count reflects activity in the bone marrow
- Following initial classification, additional tests can generally lead to the diagnosis
- Beware that reticulocytes are larger than mature red cells, so increased reticulocyte counts can produce a value for MCV above the normal range

Table 226-3 Laboratory Tests in the Evaluation of Anemia

Test	Interpretation	Clinical Correlation
MCV	Measure of the average red blood cell size.	Decreased MCV (microcytosis) is seen in chronic iron deficiency, thalassemia, anemia of chronic disease, lead poisoning.
		Increased MCV (macrocytosis) can be due to vitamin B ₁₂ or folate deficiency, alcohol abuse, liver disease, reticulocytosis, and some medications (see Diagnosis section).
Mean corpuscular hemoglobin	Measure of the amount of hemoglobin in average red blood cell.	—
Red cell distribution width	Measures the size variability of the RBC population.	In early deficiency anemia (iron, vitamin B ₁₂ , or folate), may be increased before the mean corpuscular volume becomes abnormal.
MCHC	Measure of hemoglobin concentration in average RBC.	Low MCHC can be seen in iron deficiency anemia, defects in porphyrin synthesis and hemolytic anemia.
Ferritin	Ferritin is a protein in the body that binds to iron. Serum levels serve as an indication of the amount of iron stored in the body.	Low serum ferritin is associated with iron deficiency anemia and helps differentiate this anemia from other causes.
Reticulocyte count	These RBCs of intermediate maturity are a marker of production by the bone marrow.	Decreased reticulocyte count reflects impaired RBC production.
		Increased counts are a marker of accelerated RBC production.
Peripheral blood smear	Allows visualization of the RBC morphology.	May guide to new diagnosis of diseases such as sickle cell disease.
	Allows evaluation for abnormal cell shapes.	Aids in the diagnosis of entities such as hemolytic anemia.
	Allows examination of the white blood cells and platelets.	May guide the diagnosis of other diseases that cause anemia.
Direct and indirect Coombs test	Direct Coombs test is used to detect antibodies on RBCs.	Direct Coombs test is positive in autoimmune hemolytic anemia, transfusion reactions, and some drug-induced hemolytic anemia.
	Indirect Coombs test is used to detect antibodies in the sera.	Indirect Coombs test is routinely used in compatibility testing before transfusion.

Figure 226-2.

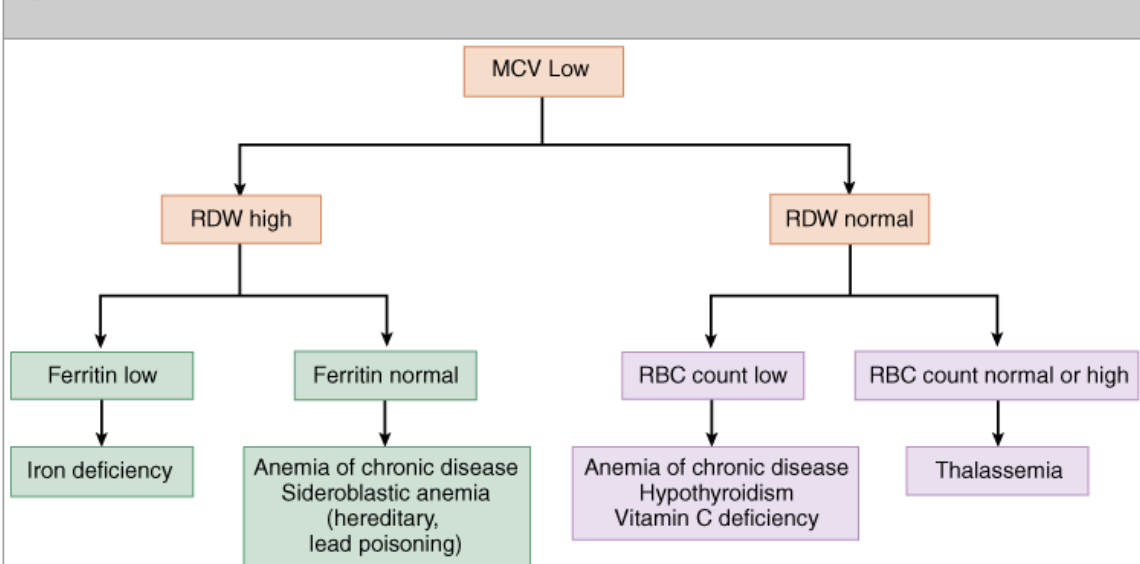


Figure 226-3.

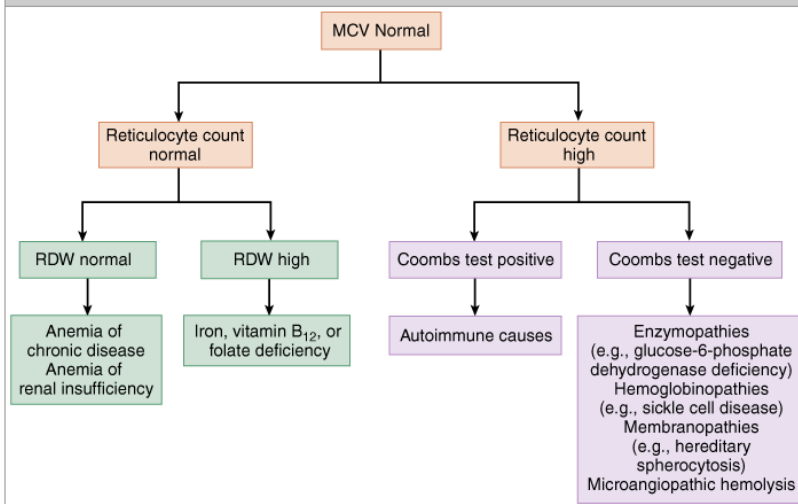
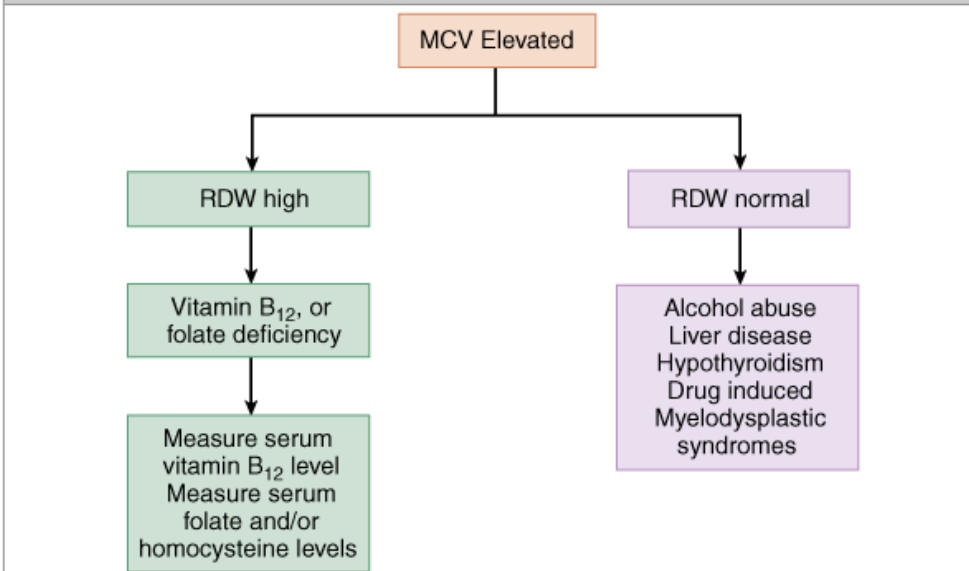


Figure 226-4.



TREATMENT:

- Treatment depends on aetiology, symptoms and clinical status of the patient
- ACUTE BLOOD LOSS REQUIRES THE MOST URGENT ATTENTION IN ED
- The decision to transfuse RBC has to INDIVIDUALISED with consideration of clinical symptoms, objective signs, age of the patient and presence of comorbid disease and likelihood of further blood loss
- In general → those that have evidence of TISSUE HYPOXIA AND/OR LIMITED CARDIOPULMONARY RESERVE, OR THOSE WHO ARE HAEMODYNAMICALLY UNSTABLE OR SYMPTOMATIC SHOULD HAVE RBC TRANSFUSED

- Those with chronic anaemia or newly diagnosed anaemia of uncertain cause do not necessarily need transfusion unless they are unstable, hypoxic, acidotic or have ongoing cardiac ischaemia
- Treatment for nutritional deficiency anaemias shown below and should result in a RETICULOCYTOSIS IN 4-7 DAYS:

Table 226-4 Treatment for Specific Anemias	
Anemia Type	Treatment (Adult Doses)
Iron deficiency anemia	Elemental iron, 200 to 300 milligrams/d (e.g., ferrous sulfate, 325 milligrams, three to four tablets taken on an empty stomach over the course of day); reticulocyte count should increase within 4–7 d and peak at 10 d; sustained treatment after correction of anemia is usually necessary to replenish iron stores.
Cyanocobalamin (vitamin B ₁₂) deficiency anemia	Cyanocobalamin, 1000 micrograms IM per week for 8 wk and every month thereafter; reticulocyte count should increase within 4 d and peak at 7 d. Oral replacement with 2000 micrograms/d may be as effective (see Treatment section).
Folate deficiency anemia	Folate, 1 milligram PO per day (doses up to 5 milligrams may be needed for patients with malabsorption); reticulocyte count should increase within 4 d with normalization of hemoglobin level in 1–2 mo.
Sideroblastic anemia	Evaluate for reversible causes, including alcohol or other drug toxicity, or toxin exposure. Discontinue any offending agents. Treatment is mainly supportive, consisting primarily of blood transfusions to maintain the hemoglobin level. A trial of pyridoxine at pharmacologic doses (500 milligrams PO daily) may be helpful, with response most commonly seen in cases resulting from ethanol abuse or the use of pyridoxine antagonists. Some patients with hereditary, X-linked sideroblastic anemia also respond to pyridoxine. Improvement with pyridoxine is rare for sideroblastic anemia of other etiologies.
Aplastic anemia	Supportive care, including transfusion if appropriate. Referral for further workup.
Anemia of chronic disease	Supportive care, including transfusion if appropriate. Referral for further workup and evaluation for underlying disease.