Physiologic anemia of pregnancy: HEMODILUTION
- 20-30% increase in RBC mass
- 30-50% increase in plasma volume
- Peaks in late 2nd & early 3rd trimester

Anemia in pregnancy

<table>
<thead>
<tr>
<th>Trimester</th>
<th>Hb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st trimester</td>
<td>&lt; 110 g/L</td>
</tr>
<tr>
<td>2nd trimester</td>
<td>&lt; 105 g/L</td>
</tr>
<tr>
<td>3rd trimester</td>
<td>&lt; 110 g/L</td>
</tr>
</tbody>
</table>

Common causes:
- Iron deficiency
- Acute blood loss

Increased iron requirements in pregnancy
- 300 mg for the fetus & placenta
- 500 mg for expansion of RBC mass
- 200 mg for losses
  = 1000 mg total

Iron supplementation in pregnancy:
30 mg elemental iron po daily
→ provided by most prenatal vitamins

PO iron therapy: 100-200 mg elemental iron/day x 3 months once Hb normalized
- Decrease absorption: food, antacids, PPIs, H2RAs
- Iron decreases absorption of other meds: levothyroxine

IM iron therapy: not recommended
- Painful
- Skin staining
- Less predictable absorption

Transfusion
- Hypovolemic blood loss
- Severe anemia, Hb < 60 g/L
  → associated with abnormal fetal oxygenation
- Operative delivery in pt with anemia

Iron supplementation in non-anemic pts
- Check ferritin in pts at risk of iron depletion:
  - Previous anemia
  - Multiple pregnancies
  - Consecutive pregnancies w/ <1 year interval in-between
  - Vegetarians
- If ferritin < 30, iron 60 mg po daily

Treatment:
- Dietary considerations:
  - Dietician consult
  - Heme iron rich foods: lean meat, seafood
  - Non-heme iron rich foods: veggies, beans, cereals, dairy products, etc
- Trial of iron: presumptive diagnosis of IDA
  - Iron therapy given to pts w/o evidence of other causes of anemia w/o obtaining iron studies
- Transfusion?

IV iron therapy

Indications
- Non-compliance
- Intolerance
- Malabsorption
- Ongoing bleeding
- Severe anemia

Contraindications
- History of anaphylaxis
- Active infection
- First trimester

Iron sucrose: 20 mg elemental iron/mL
→ 100-300 mg elemental iron per infusion
  - Multi-dose infusions to a total of 1000 mg
→ Iron deficit = body weight (kg) x (target-actual Hb) x 0.024 ÷ 500 mg

Example order: 300 mg iron sucrose IV once daily x 3 days
→ Max infusion rate: 100 mg/h

Monitoring
- Maternal vital signs & fetal HR prior to infusion
- Maternal vitals & fetal HR q15 min during first infusion hour, then hourly until infusion complete
- Maternal vitals 1h post infusion

NOTE: anaphylaxis kit must be readily available
→ IV iron sucrose SEs overlap with S/S of anaphylaxis

Postpartum considerations: anemia = Hb < 100 g/L
- Contributing factors:
  - Antepartum anemia not corrected
  - Blood loss during delivery
  - Breastfeeding
Anemia in infants/children: normal ranges for Hb & hct, and causes of anemia, vary with age, sex, race
- Hb < 2.5 percentile for age, sex, race
- Serum ferritin < 12 ug/L
- Simplified, WHO definition:

<table>
<thead>
<tr>
<th>Age</th>
<th>Hb (g/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mo – 5 y</td>
<td>&lt; 110</td>
</tr>
<tr>
<td>5 – 12 y</td>
<td>&lt; 115</td>
</tr>
<tr>
<td>12 – 15 y</td>
<td>&lt; 120</td>
</tr>
</tbody>
</table>

Common causes
- Birth – 3 months: physiologic anemia (6-9 wks of age)
  → When born, Hb is high (165) → EPO decreases at birth, RBC counts lower, Hb decreases (110)
- 3-6 mo: hemoglobinopathy (hereditary)
- Toddlers/children: acquired causes (iron deficiency anemia)

Drug causes of anemia
- Nitrofurantoin: avoid near delivery; avoid in neonates
- SMX/TMP: avoid, esp in 1st tri & near term; avoid in neonates

Iron deficiency anemia in children: growth + lack of adequate intake

Risk factors
- Prematurity/low birth weight
- Low socioeconomic status
- Early introduction of cow’s milk
- Excessive cow’s milk intake
- Prolonged exclusive breastfeeding
- Diet low in iron
- Medical conditions
  - Interfere w/ iron absorption
  - Malabsorption
  - Blood loss

Screening
- Risk assessment: 9-12 months, 6 months later; annually in children 2-5 years
- S/S: often asymptomatic
  - Lethargy
  - Irritability
  - Poor feeding
  - Pallor
- Lab screening: high risk population
  → 9-12 mo, 6 mo later, annually from 2-5 years

Outcomes of IDA in children
- Developmental delays
- Behavioral disturbances
  - Decreased motor activity
  - Decreased social interaction
  - Decreased attention to tasks

Prevention of IDA in children
- Breastfeeding
  → Exclusive until 4-6 mo, then breastfeed with food
- Iron fortified formula (if can’t breastfeed)
- Discourage cow’s milk (until 12 mo)
  → At 12 mo: max 750 mL/day
- Iron rich foods (iron fortified cereal, pureed meats)

Treatment of IDA in children
- Dietary change
- Oral ferrous sulfate: 3-6 mg/kg/day (divided doses)
- Liquid preparations can stain teeth
  → Mix with water or juice
  → Use a dropper
  → Brush teeth/rinse mouth after administration
- GI side effects uncommon at these doses
- Recheck Hb in 4 weeks

Anemia of prematurity (AOP): anemia secondary to impaired EPO production (occurs 3-12 weeks of life)
→ Other contributory factors are blood draws & a reduced RBC life span

AOP management
- Iron supplementation
- RBC transfusion