



Obstetric Critical Care Symposium

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Etiologies of Maternal Cardiac Arrest

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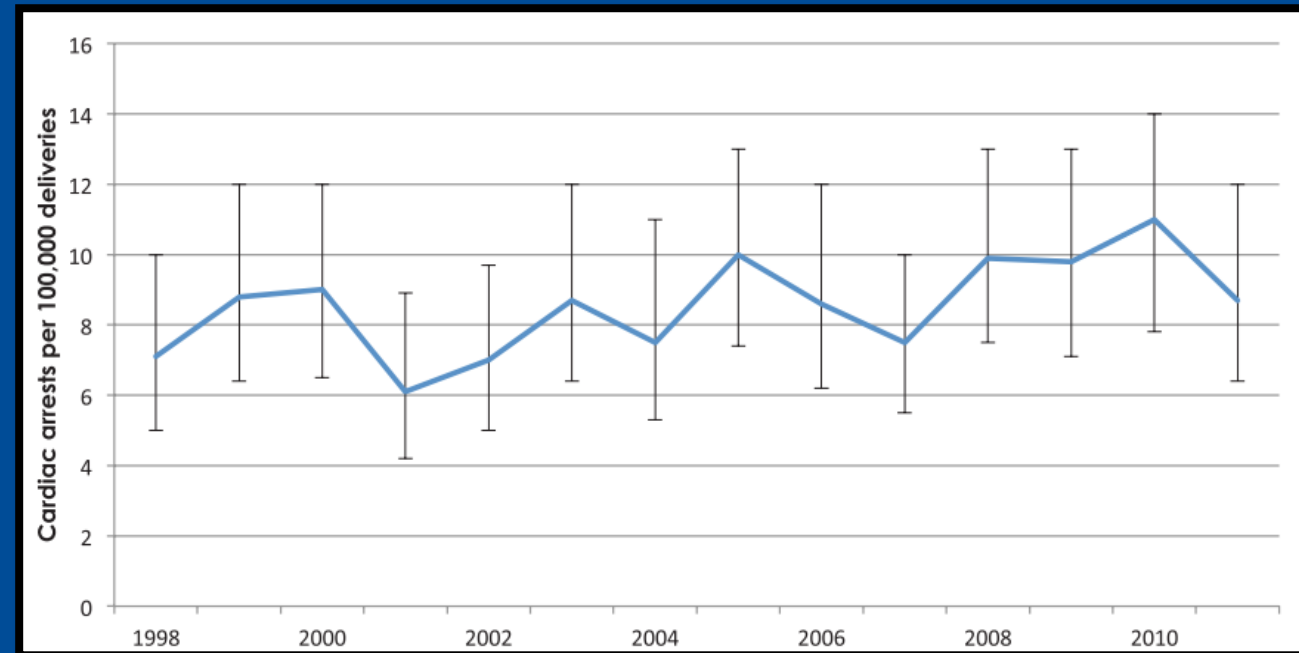
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Objectives

1. Review the epidemiology and clinical significance of maternal cardiac arrest
2. Identify common reversible causes of maternal cardiac arrest

Background

- Maternal cardiac arrest complicates 1 in 12,000 to 36,000 delivery admissions
- The incidence appears to be increasing in the U.S.
- Survival improves with rapid identification of reversible causes
- Etiology can differ from non-pregnant cardiac arrest



Background

- Kurzeja et al.
 - Retrospective cohort study identified 31 pregnant or postpartum patient with in-hospital cardiac arrest at a tertiary care center over 15.5 years, an incidence of 2/10,000 deliveries
 - ROSC in 87.1% of patients with median of 2 minutes
 - 77.4% survived until discharge
 - 11 cases occurred antepartum
 - Anesthetic complications
 - 20 cases occurred postpartum
 - Hemorrhage
 - Amniotic fluid embolism

Differential Diagnosis

Anesthesia

- High neuraxial block, airway complications

Accidents

- Trauma

Bleeding

- Atony, abnormal placentation, DIC

Cardiovascular

- Acquired or congenital heart disease, arrhythmias, ischemia, aortic dissection

Drugs

- Overdose, anaphylaxis, uterotonics, magnesium sulfate

Embolism

- Venous, amniotic fluid

Fever

- Sepsis, viral syndromes, ARDS

General

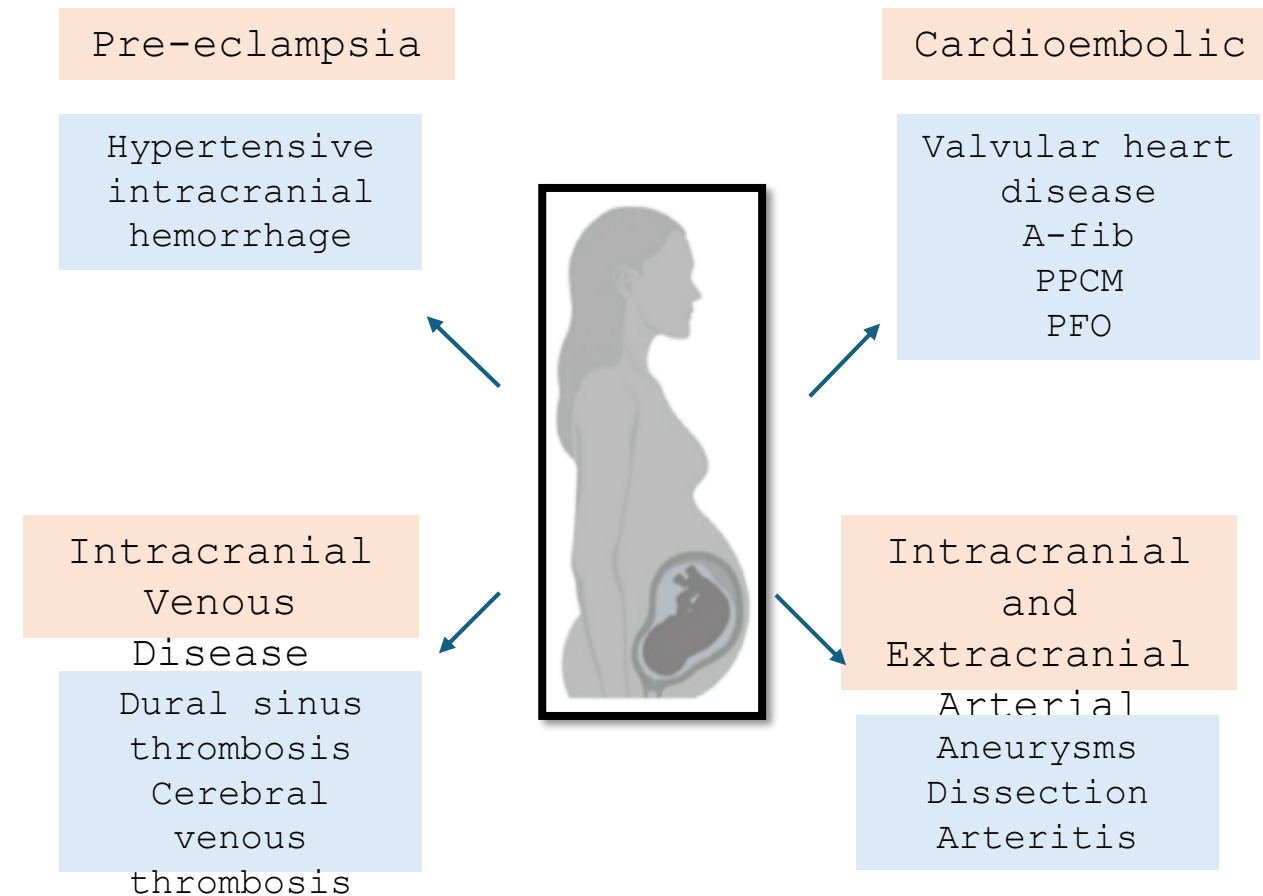
- Metabolic abnormalities, hypocalcemia or hyperkalemia with massive hemorrhage

Hypertension

- Preeclampsia, HELLP syndrome

Stroke

- Epidemiology
 - Incidence: 20-40 per 100,000 pregnancies
 - Risk increased 3-fold compared to nonpregnant women
 - Accounts for ~7-8% of pregnancy-related deaths
- Stroke Type
 - ~50% hemorrhagic (vs. 13% in general population)
- Mechanism Leading to Arrest
 - Intracranial hemorrhage -> increased ICP -> herniation
 - Loss of brainstem function -> respiratory arrest
 - Secondary hypoxia -> cardiac arrest
- Pregnancy Specific Drivers
 - Hypertensive disorders of pregnancy (major driver)
 - Postpartum period highest risk



High Neuraxial Block

■ Epidemiology

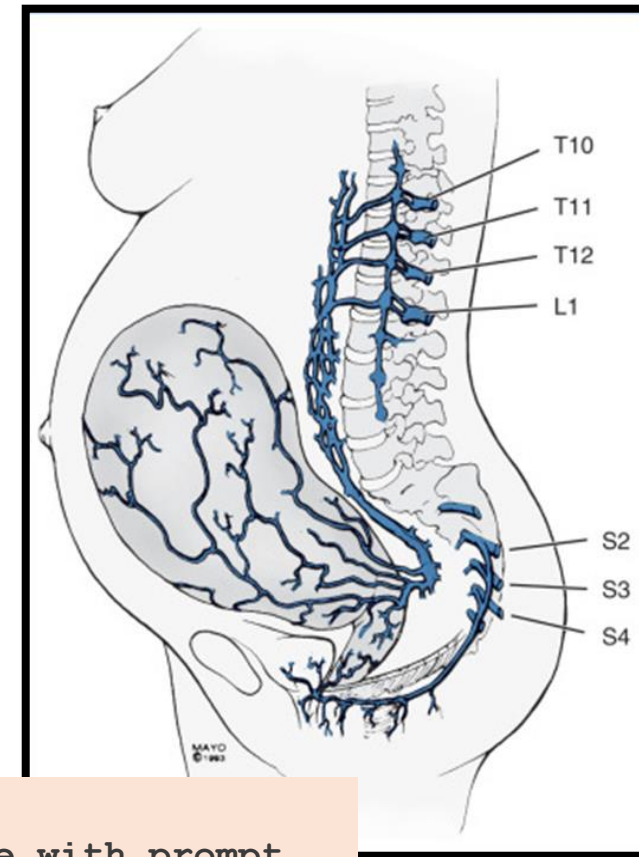
- Rare but serious complication of obstetric anesthesia
- Incidence 1:4,000-30,000
- Major contributor to anesthesia-related maternal morbidity/mortality

■ Risk Factors

- Recent epidural bolus --> spinal anesthesia
- Obesity, multiple gestation
- Short stature / Altered anatomy
- High or repeated dosing

■ Mechanism Leading to Arrest

- Ascending block -> respiratory muscle paralysis -> apnea
- Cardiac sympathetic blockade -> bradycardia, hypotension
- Decreased CO -> CV collapse -> arrest



Key points:

- 1) Often rapidly progressive but reversible with prompt airway and hemodynamic support
- 2) Early signs: upper extremity weakness, difficulty speaking, agitation

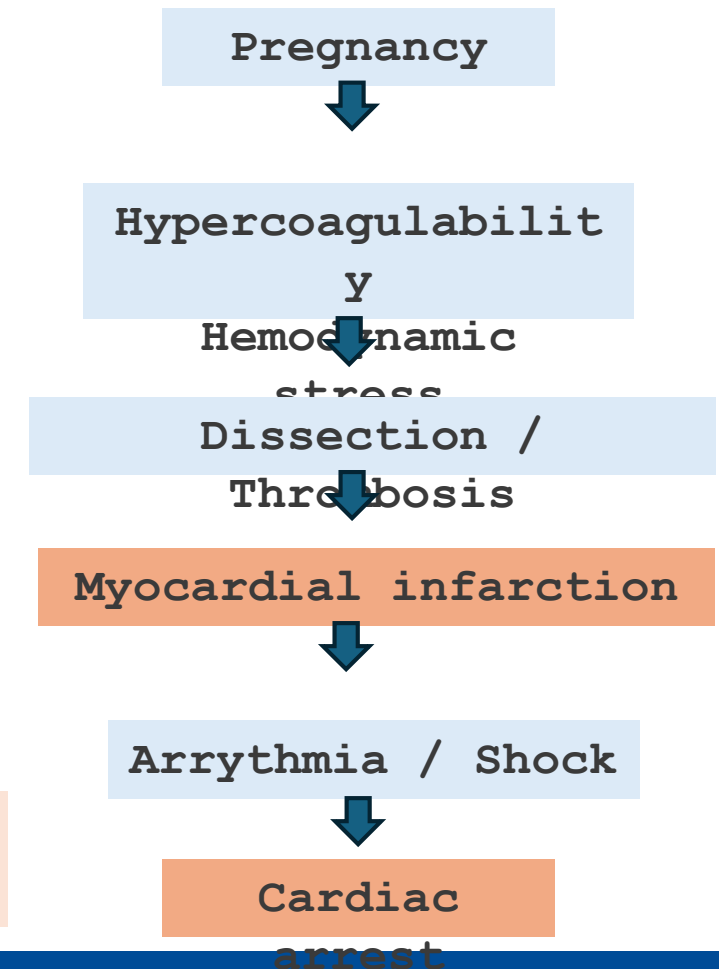
Myocardial Infarction

- Rare: ~3–10 per 100,000 pregnancies
- Risk ↑ 3–4-fold in pregnancy
- Case fatality ~5–11%

- **Pregnancy Specific Risk Factors**

- Advanced maternal age
- HTN, DM, smoking
- Thrombophilia
- Preeclampsia

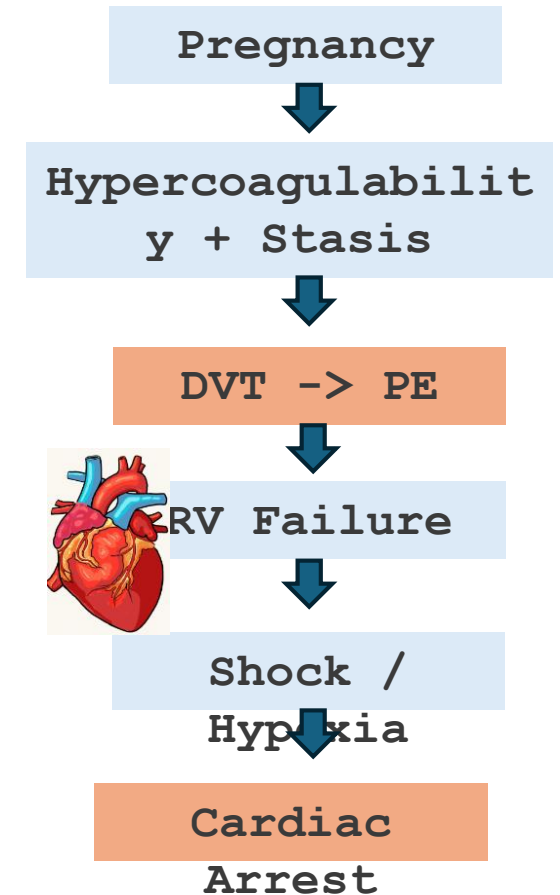
Key point: Coronary dissection is a major pregnancy specific driver of MI



Pulmonary Embolism

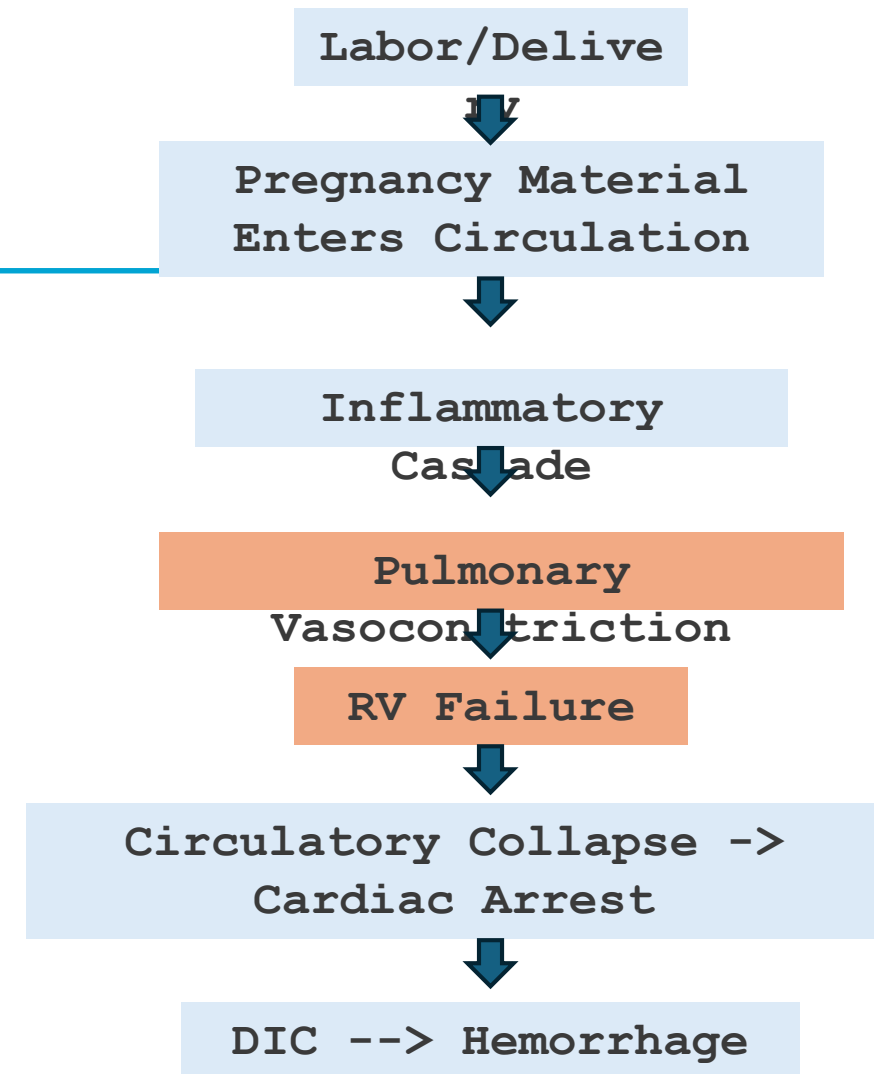
- Epidemiology
 - Leading cause of maternal mortality (~10-14%)
 - Incidence 0.4 per 1,000 deliveries
 - Majority occur postpartum
- Pathophysiology (Virchow's Triad)
 - Hypercoagulability
 - Venous stasis (uterine compression)
 - Endothelial injury (delivery)
- Risk Factors
 - Prior VTE (strongest risk factor)
 - Thrombophilia
 - Obesity / immobility
 - Cesarean delivery, infection
 - Hypertensive disorders

Key point: Risk is highest in the first 3-6 weeks postpartum



Amniotic Fluid Embolism

- Epidemiology:
 - Rare: 2-6 per 100,000 births
 - High mortality, up to ~60%
 - Unpredictable, no reliable prevention
- Pathophysiology:
 - Entry of fetal/amniotic material into maternal circulation
 - Triggers inflammatory cascade (SIRS like response)
 - Pulmonary vasoconstriction + clotting activation (Factor VII)
- Clinical Presentation (Classic Triad):
 - 1) Hypoxia, 2) Hypotension, 3) Coagulopathy (DIC)
 - Often occurs during labor or immediately postpartum
- Mechanism Leading to Arrest:
 - Acute pulmonary vasoconstriction -> right ventricular failure
 - Decreased CO -> cardiovascular collapse
 - Severe Hypoxia -> cardiac arrest
 - DIC -> hemorrhagic shock



Key points:

1) AFE is a clinical diagnosis of sudden collapse with DIC

2) Often presents as cardiac arrest as the first sign

Acute Fatty Liver of Pregnancy

■ Epidemiology

- Rare: ~1 in 7,000-20,000 pregnancies
- Typically presents in the third trimester
- History high mortality, now improved with early recognition

■ Pathophysiology

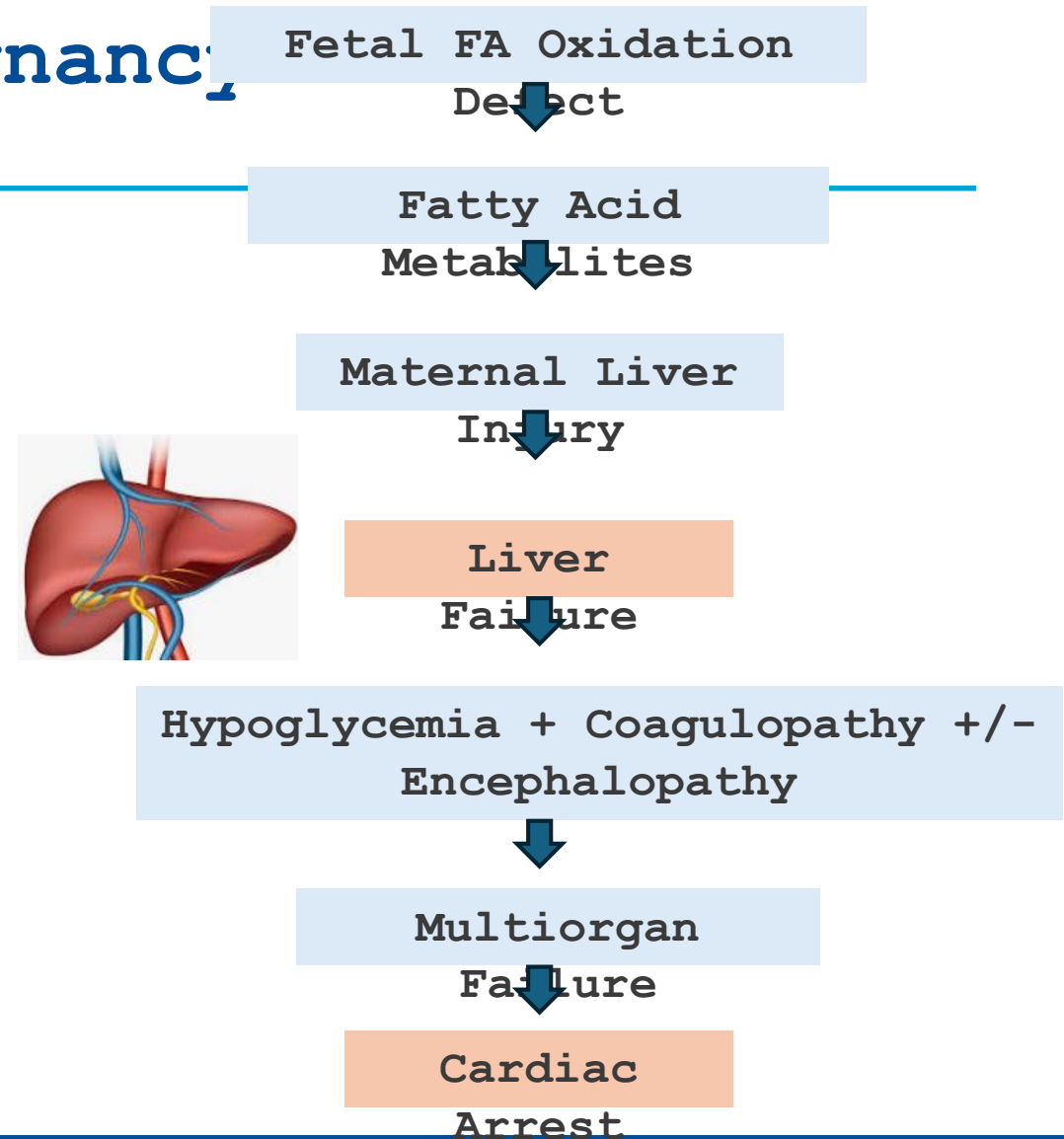
- Fetal FA oxidation defect
- Toxic metabolites to maternal circulation
- Microvesicular steatosis -> liver failure
- Coagulopathy + hypoglycemia

■ Clinical Features

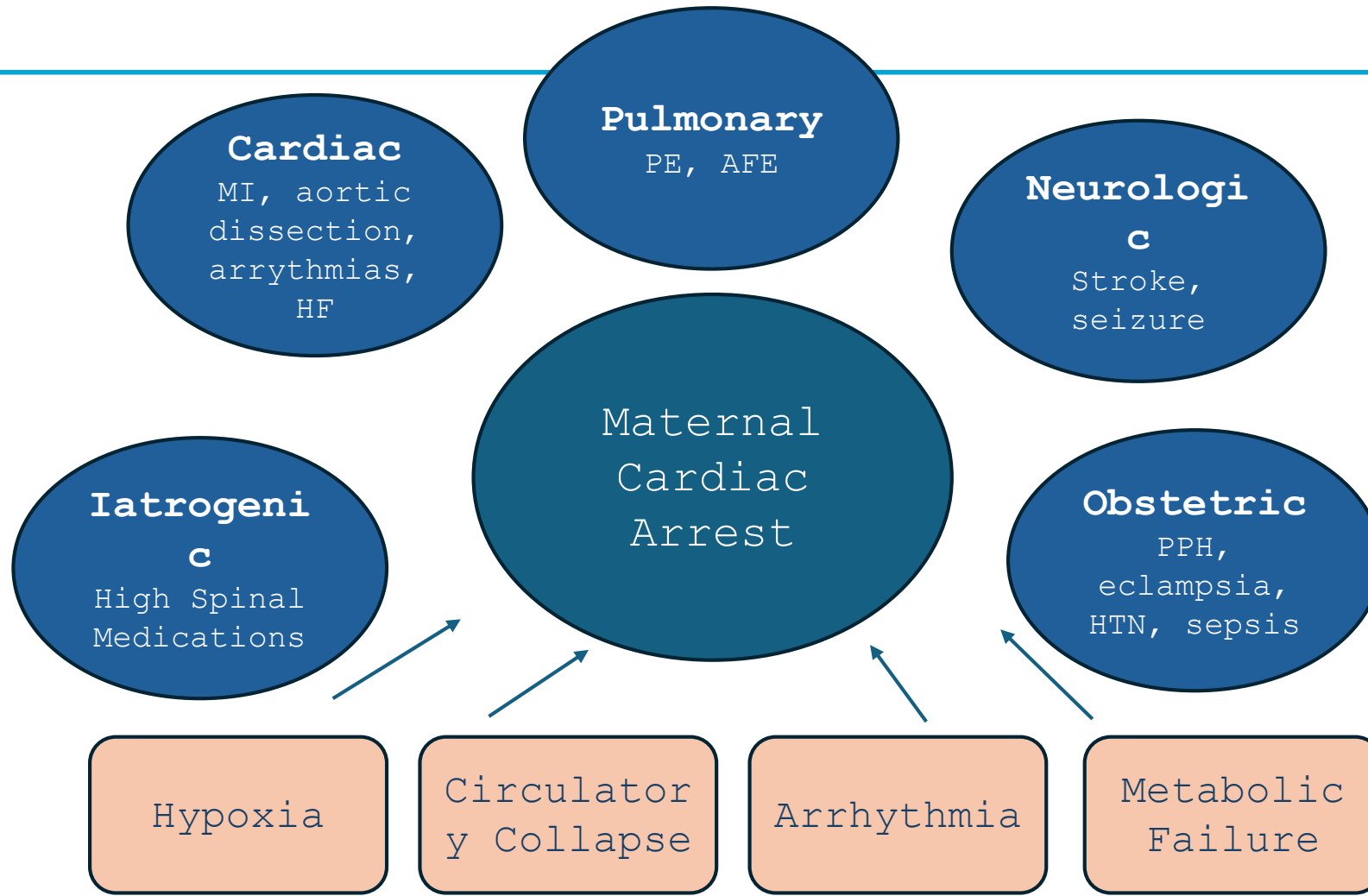
- Nausea, vomiting, abdominal pain
- Jaundice, encephalopathy
- Labs: hypoglycemia, coagulopathy / DIC, renal dysfunction

■ Mechanism Leading to Arrest

- Hepatic failure -> metabolic derangements
- Coagulopathy -> hemorrhage
- Encephalopathy -> loss of airway
- Multiorgan failure -> CV collapse -> arrest



Maternal Cardiac Arrest: Etiology Matters



References

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