Disclosures

I have no actual or potential conflict of interest in relation to this program/presentation.

I will not be discussing any off-label use of any medications or industry sponsored products.
Objectives

At the end of the session participants will be able to:
1. Discuss the key components of an obstetric history as it pertains to future wellness.
2. Understand the connection between pregnancy complications and long-term health.
3. Implement appropriate follow up preventative care and screening strategies for women who have had pregnancy complications.

What is your specialty?
I routinely obtain a complete obstetrical history on my new patients or patients who are postpartum?

True  
False

If you answered "False" please explain why?
Why are we here?

- We have a role to improve health outcomes
- Women receive care centered around pregnancy
- We as providers play a bigger role in the overall current and future health of women and their families and have an opportunity to change the paradigm.

There are adverse outcomes in pregnancy that affect the future health the mother and her offspring.

We will focus on the mother
Health Care Services for U.S. Women is Fragmented

Care provided by general physicians and by ob-gyns differs...

**OB/GYN**
- Contraceptive care
- Cervical cancer screening
- Breast cancer screening

**General Physicians**
- Colorectal cancer
- Hyperlipidemia
- Diabetes
- Comorbid conditions
Keeping in mind that...

- Having care from both types of physicians leads to increased receipt of preventive services
- Higher level of patient satisfaction with care
- When our mutual patients come back to see you...
  - Their medical history may have gotten worse

Postpartum Follow Up Timing

- 4 to 6 weeks after delivery for uncomplicated patients
- 7 to 14 days after delivery with
  - High-risk for complications
  - Cesarean deliveries
Maternal, Infant, and Child Health

MICH-19 Increase the proportion of women giving birth who attend a postpartum care visit with a health care worker

Mothers attending a postpartum care visit (percent)

<table>
<thead>
<tr>
<th>POPULATIONS</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>90.1</td>
<td>89.8</td>
<td>90.1</td>
<td>88.5</td>
</tr>
</tbody>
</table>

Barriers to Care

- Lack of childcare
- Inability to get an appointment
- Mistrust of healthcare providers
- Visits less common among
  - Women under the age of 20, compared with women over the age of 30
  - Women who identified as Hispanic or Latino
  - Uninsured women and women with public insurance
  - Unstable housing
  - Transportation barriers
  - Difficulties communicating with medical providers

Common conditions in pregnancy that need followed up and have implications for long term health, opportunities for preventative care intervention or increased screening.

### Common Conditions in Pregnancy

#### Maternal
- Pregnancy related hypertension
  - Preeclampsia
- Gestational thrombocytopenia
- Gestational diabetes
- Perinatal depression
- Weight gain
- Thyroiditis
- Intrahepatic Cholestasis of Pregnancy

#### Fetal
- Fetal or neonatal loss
- Arrhythmias
- Growth restriction
Past, Present & Future

Pregnancy Related Hypertension
Hypertension in Pregnancy (10%)

- Diastolic blood pressure >90 mm Hg and/or systolic blood pressure >140 mm Hg
- ≥2 separate occasions ≥4 hours apart.
- Proteinuria was diagnosed with urinary protein was >300 mg/24 h
- Protein : Creatinine ratio

20 weeks

Pregnancy as a Cardiovascular Stress Test

- Chronic (Preexisting) Hypertension (0.5-3%)
  - Superimposed Preeclampsia
- Acute Hypertension In Pregnancy
  - Gestational Hypertension
  - Preeclampsia without Severe Features
  - Preeclampsia with Severe Features
  - Eclampsia
  - HELLP Syndrome

Sattar and Greer
Cardiovascular Disease in Women

1 death per minute in the US

Leading Causes of Death

By AMERICAN HEART ASSOCIATION NEWS

Heart disease continues to kill more Americans than any other cause, followed by stroke at No. 5, according to 2015 federal data.

<table>
<thead>
<tr>
<th>Total Deaths</th>
<th>Share of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>633,842</td>
</tr>
<tr>
<td>Cancer</td>
<td>595,950</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>155,041</td>
</tr>
<tr>
<td>Accidents</td>
<td>144,571</td>
</tr>
<tr>
<td>Stroke</td>
<td>140,323</td>
</tr>
<tr>
<td>Alzheimer's disease</td>
<td>110,561</td>
</tr>
<tr>
<td>Diabetes</td>
<td>79,535</td>
</tr>
<tr>
<td>Flu, pneumonia</td>
<td>57,063</td>
</tr>
<tr>
<td>Kidney disease</td>
<td>49,959</td>
</tr>
<tr>
<td>Suicide</td>
<td>44,193</td>
</tr>
</tbody>
</table>

Source: Centers for Disease Control and Prevention

Published Dec. 8, 2016


Note: The cause of death is unknown for 6.4% of all pregnancy-related deaths
Maternal Placental Syndromes (MPS)

- 2005 retrospective population-based cohort
- Identified women with placental syndromes
  - GHTN, IUFD, IUGR, Abruptio
- Primary outcome composite of cardiovascular disease
- Database of >1 million women
  - Excluded death prior to 24 months PP, <14 y/o, living outside of study area
  - 35380 w/ MPS
  - Mean follow-up 7.8 years

Cardiovascular health after maternal placental syndromes (CHAMPS): population-based retrospective cohort study (2005)

Risk of premature cardiovascular disease associated with a maternal placental syndrome (MPS) or an affected fetus, or both
<table>
<thead>
<tr>
<th>Study</th>
<th>Study design and location</th>
<th>Study group</th>
<th>Control group</th>
<th>Outcomes (study group vs control group; 95% CIs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann et al. (1976)</td>
<td>Case-control study (1968–1972), UK</td>
<td>Women &lt;45 years of age treated for myocardial infarction</td>
<td>Age-matched, treated for conditions other than myocardial infarction</td>
<td>Myocardial infarction: RR 3.0 for history of pre-eclampsia</td>
</tr>
<tr>
<td>Croft and Hannaford (1989)</td>
<td>Nested case-control study (RCGP Oral Contraceptive Study), UK</td>
<td>Women with acute myocardial infarction</td>
<td>Women without acute myocardial infarction</td>
<td>Myocardial infarction: RR 2.8 (1.7–4.8) for history of toxemia \footnote{Toxemia' is a synonym for pre-eclampsia that was used in the 1960s.}</td>
</tr>
<tr>
<td>WHO (1995)</td>
<td>Collaborative, case-control study, 21 centers in 17 countries</td>
<td>Women with venous thromboembolism\footnote{Venous thromboembolism includes deep venous thrombosis and pulmonary embolism. Abbreviations: OR, odds ratio; RCGP, Royal College of General Practitioners; RR, relative risk.}</td>
<td>Age-matched, without venous thromboembolism</td>
<td>Venous thromboembolism: OR 1.66 (1.20–2.29) for history of hypertension in pregnancy in Europe and 1.16 (0.89–1.52) in developing countries</td>
</tr>
<tr>
<td>WHO (1996)</td>
<td>Collaborative, case-control study, 21 centers in 17 countries</td>
<td>Women who suffered a cerebrovascular accident</td>
<td>Age-matched, without a cerebrovascular accident</td>
<td>Cerebrovascular accident: OR 1.94 (1.26–2.97) for history of hypertension in pregnancy in Europe and 2.54 (2.01–3.20) in developing countries</td>
</tr>
<tr>
<td>Brown et al. (2006)</td>
<td>Population-based case-control study (Stroke Prevention in Young Women Study) (1992–1996), USA</td>
<td>Women who suffered a cerebrovascular accident</td>
<td>Women without a cerebrovascular accident</td>
<td>Cerebrovascular accident: OR 1.63 (1.02–2.82) for history of pre-eclampsia</td>
</tr>
</tbody>
</table>

**Preeclampsia Risk and Cancer**

**OBJECTIVE:**
- To quantify the risk of future cardiovascular diseases, cancer, and mortality after pre-eclampsia.

**DESIGN:**
- Systematic review and meta-analysis.

**Relative Risk**
- 3 x Hypertension  - 10 years
- 2 x Ischemic heart disease - 11 years
- 1.8 x Stroke 1.81 - 10 years
- 1.8 x Venous thromboembolism - 4 years
- **1.5 x overall mortality! – 14 years**

- No increase in risk of any cancer including breast cancer 17 years after pre-eclampsia

Women with GHTN or Preeclampsia have:
Higher BMI, total cholesterol, LDL, Triglycerides, higher risk diabetes

Preeclampsia & CVD Pathway

Endothelial dysfunction
Hypertensive disorders of pregnancy
Cardiovascular disease

How fast does it resolve?

- 29-57% by 3 days
- 50-87% by seven days
- CHTN, high BMI, long duration of treatment, PreE w/ preterm delivery or higher SDP/DBP More likely to persist to 12 weeks
- After 12 weeks up to 10% will have secondary HTN
- Reassess urine protein:
  - ~3% 20-39 years old have CKD Stage I or II
Other Cardiac Diseases

- Women identified as high risk should be evaluated at 3 months in a comprehensive cardiovascular postpartum visit.

- This 3-month comprehensive cardiovascular postpartum visit:
  - Pregnancy Heart Team
  - obstetrician–gynecologist or other primary care provider
  - history of pertinent symptoms, a physical examination, an assessment of height and weight (BMI), waist circumference, heart rate, respiratory rate, blood pressure, and oxygen saturation.
  - Laboratory testing
  - Fasting blood glucose or hemoglobin A₁c
  - Complete lipid profile.
  - Yearly follow-up with their primary care physician
  - Contraception
Preeclampsia & Diabetes

Preeclampsia is associated with:

- Increased insulin resistance
- Metabolic syndrome: hypertension, lower serum high-density lipoprotein, higher plasma levels of triglycerides, uric acid, and insulin.
- Preeclampsia is also recognized as a
- State of sympathetic overactivity and proinflammatory changes both related closely to insulin resistance.
- Thus, preeclampsia may be the first manifestation of the metabolic syndrome.
Gestational Diabetes

Insulin Requirements during Pregnancy

- - - - = Usual insulin production during pregnancy
- - - - = Shortage of insulin production during pregnancy with gestational diabetes

Marcinkevage and Narayan 2011
- 7% of pregnancies DM
- 86% gestational DM
- RF: Race, obesity, increasing age

- 33% will have DM or impaired glucose metabolism at PP screen
- 15% and 70% will develop diabetes later in life
- Sevenfold increased risk of developing type 2 (GDM vs never GDM)

Cumulative incidence of type 2 diabetes is highest during the first 5 years.
Risk of CVD with GDM?

Hazard Ratio:
1.71 (95% CI 1.08–2.69)
1.13 [95% CI 0.67–1.89])

Figure 1—Kaplan-Meier survival curves for CVD and CAD events and hazard ratios (HRs) derived from Cox proportional hazards regression.

Pregnancy and Thrombophilia
Pregnancy is a Thrombophilic State

- During pregnancy, clotting factors I, VII, VIII, IX, and X rise
- Protein S and fibrinolytic activity diminish
- Resistance to activated protein C develops

- Risk of venous thrombosis is increased by 7- to 10-fold
- Risk highest after delivery
- This risk is about 3-fold higher than that associated with combined oral contraceptives.

Inherited vs Acquired

INHERITED
- Protein S deficiency
- Protein C deficiency
- Protein Z deficiency
- Antithrombin III
- Factor V Leiden mutation
- MTHFR mutation
- Prothrombin G20210A mutation

ACQUIRED
- Antiphospholipid antibody syndrome
  - Most common acquired thrombophilia of pregnancy
- Lupus anticoagulant
- Anticardiolipin antibodies
- Activated protein C resistance
### Risk of thromboembolism during pregnancy and postpartum in women with thrombophilia

<table>
<thead>
<tr>
<th>THROMBOPHILIA</th>
<th>ASYMPOTOMATIC WOMEN</th>
<th>HISTORY OF VENOUS THROMBOEMBOLISM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor V Leiden</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterozygous</td>
<td>0.2</td>
<td>10</td>
</tr>
<tr>
<td>Homozygous</td>
<td>1-2</td>
<td>15-20</td>
</tr>
<tr>
<td>Prothrombin gene mutation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterozygous</td>
<td>0.5</td>
<td>10</td>
</tr>
<tr>
<td>Homozygous</td>
<td>2.3</td>
<td>20</td>
</tr>
<tr>
<td>Factor V Leiden and prothrombin gene mutation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Antithrombin deficiency</td>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>Protein C deficiency</td>
<td>0.5</td>
<td>5-15</td>
</tr>
<tr>
<td>Protein S deficiency</td>
<td>0.1</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

**Antithrombin III**
MOST THROMBOGENIC

Risk is to mom, no OB indications to check

---

### Antiphospholipid Diagnosis

- **Clinical**
  - VASCULAR – Venus or arterial thrombosis
  - One or more fetal losses >10 weeks documented normal
  - Three or more consecutive unexplained pregnancy losses <10 weeks
  - Premature birth (<34 weeks) from preeclampsia/placental insufficiency

- **Labs**
  - Anticardiolipin antibodies immunoglobulin G (IgG) and immunoglobulin M (IgM) NOT A
  - IgG and IgM anti-β2-glycoprotein I
  - Lupus anticoagulant

Associated conditions: hemolytic anemia, autoimmune thrombocytopenia, amaurosis fugax, livedo reticularis, systemic lupus erythematosus, and a false-positive rapid plasma reagin result.
Table 3. Recommended Thromboprophylaxis for Pregnancies Complicated by Inherited Thrombophilias*

<table>
<thead>
<tr>
<th>Clinical Scenario</th>
<th>Antepartum Management</th>
<th>Postpartum Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-risk thrombophilia† without previous VTE</td>
<td>Surveillance without anticoagulation therapy</td>
<td>Surveillance without anticoagulation therapy or postpartum prophylactic anticoagulation therapy if the patient has additional risks factors</td>
</tr>
<tr>
<td>Low-risk thrombophilia† with a family history (first-degree relative) of VTE</td>
<td>Surveillance without anticoagulation therapy or prophylactic LMWH/UFH</td>
<td>Postpartum prophylactic anticoagulation therapy or intermediate-dose LMWH/UFH</td>
</tr>
<tr>
<td>Low-risk thrombophilia† with a single previous episode of VTE—Not receiving long-term anticoagulation therapy</td>
<td>Prophylactic or Intermediate-dose LMWH/UFH</td>
<td>Postpartum prophylactic anticoagulation therapy or intermediate-dose LMWH/UFH</td>
</tr>
<tr>
<td>High-risk thrombophilia† without previous VTE</td>
<td>Prophylactic or Intermediate-dose LMWH/UFH</td>
<td>Postpartum prophylactic anticoagulation therapy or intermediate-dose LMWH/UFH</td>
</tr>
<tr>
<td>High-risk thrombophilia† with a single previous episode of VTE—Not an affected first-degree relative—Not receiving long-term anticoagulation therapy</td>
<td>prophylactic, intermediate-dose, or adjusted-dose LMWH/UFH</td>
<td>Postpartum prophylactic anticoagulation therapy, or intermediate or adjusted-dose LMWH/UFH for 6 weeks (therapy level should be equal to the selected antepartum treatment)</td>
</tr>
<tr>
<td>Thrombophilia with two or more episodes of VTE—Not receiving long-term anticoagulation therapy</td>
<td>Intermediate-dose or adjusted-dose LMWH/UFH</td>
<td>Postpartum anticoagulation therapy with intermediate-dose or adjusted-dose LMWH/UFH for 6 weeks (therapy level should be equal to the selected antepartum treatment)</td>
</tr>
<tr>
<td>Thrombophilia with two or more episodes of VTE—Receiving long-term anticoagulation therapy</td>
<td>Adjusted-dose LMWH/UFH</td>
<td>Resumption of long-term anticoagulation therapy. Oral anticoagulants may be considered postpartum based upon planned duration of therapy, lactation, and patient preference.</td>
</tr>
</tbody>
</table>

Abbreviations: LMWH, low-molecular-weight heparin; UFH, unfractionated heparin; VTE, venous thromboembolism.
*Postpartum treatment levels should be equal to antepartum treatment.
†Low-risk thrombophilia: factor V Leiden heterozygous; prothrombin G20210A heterozygous; protein C or protein S deficiency.
‡First-degree relative with a history of a thrombotic episode or other major thrombosis risk factors (e.g., obesity, prolonged immobility, cancer, delivery).
§High-risk thrombophilias include factor V Leiden homozygosity, prothrombin G20210A mutation homozygosity, heterozygosity for factor V Leiden and prothrombin G20210A mutation, or antithrombin deficiency.

Autoimmune Diseases and Pregnancy
Immunotolerance in Pregnancy

At implantation, of helper T-cell 1 (TH1) dominance to TH2 dominance

Pregnancy

- Spontaneous abortion
- Premature delivery
- Preeclampsia
- Intrauterine growth restriction

Higher TH2 State Leads to Improvement of:

TH1-dominant immune disease:
- Rheumatoid arthritis
- Thyroiditis
- Multiple sclerosis

(TH2-dependent immune diseases, such as systemic lupus erythematosus, fare worse during pregnancy)

Majority of women relapse during the 1st 12 months PP
RA: onset occurs in 9.7-28.3% after pregnancy
- PP state confers 5-fold relative risk of new-onset rheumatoid arthritis compared with any other time
- Risk highest after 1st pregnancy
Gestational Weight Gain

First pregnancy
GWG leads to:
↑BMI
↑Fat mass
↑Visceral fat

GWG retained

Second Pregnancy
↑Preconception BMI
↑Excess GWG
↑Fat mass
↑Visceral fat

Later in life
↑BMI
↑Fat mass
↑Visceral fat

Metabolic consequences:
↑GDM
↑Preeclampsia
↑Hypercholesterolemia

↑Risk for type II diabetes
↑Risk for cardiovascular disease
↑Risk for metabolic syndrome
Relative Risks From Nonlinear Dose-Response Analysis for Maternal BMI and Fetal Death, Stillbirth, and Neonatal, Perinatal, and Infant Death

<table>
<thead>
<tr>
<th>BMI</th>
<th>17</th>
<th>20</th>
<th>22.5</th>
<th>25</th>
<th>27.5</th>
<th>30</th>
<th>32.5</th>
<th>35.0</th>
<th>37.5</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal Death (n = 61)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>1.02</td>
<td>1.07</td>
<td>1.17</td>
<td>1.34</td>
<td>1.59</td>
<td>1.97</td>
<td>2.50</td>
<td>2.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>78</td>
<td>76</td>
<td>78</td>
<td>82</td>
<td>89</td>
<td>102</td>
<td>121</td>
<td>150</td>
<td>197</td>
<td>270</td>
</tr>
<tr>
<td>Stillbirth (n = 18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>0.92</td>
<td>1.09</td>
<td>1.20</td>
<td>1.32</td>
<td>1.46</td>
<td>1.63</td>
<td>1.78</td>
<td>1.97</td>
<td>2.19</td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>40</td>
<td>44</td>
<td>46</td>
<td>53</td>
<td>59</td>
<td>65</td>
<td>71</td>
<td>80</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Perinatal Death (n = 18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>0.99</td>
<td>1.11</td>
<td>1.20</td>
<td>1.31</td>
<td>1.43</td>
<td>1.59</td>
<td>1.76</td>
<td>1.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>65</td>
<td>66</td>
<td>69</td>
<td>73</td>
<td>79</td>
<td>86</td>
<td>94</td>
<td>105</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>Neonatal Death (n = 93)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>0.94</td>
<td>1.05</td>
<td>1.12</td>
<td>1.20</td>
<td>1.30</td>
<td>1.42</td>
<td>1.55</td>
<td>1.71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>16</td>
<td>20</td>
<td>22</td>
<td>24</td>
<td>26</td>
<td>29</td>
<td>31</td>
<td>34</td>
<td></td>
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</tr>
<tr>
<td>Infant Death (n = 43)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RR (95% CI)</td>
<td>1.01</td>
<td>1.03</td>
<td>1.19</td>
<td>1.30</td>
<td>1.43</td>
<td>1.58</td>
<td>1.75</td>
<td>1.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>34</td>
<td>34</td>
<td>37</td>
<td>40</td>
<td>48</td>
<td>53</td>
<td>58</td>
<td>65</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: AR, absolute risk; BMI, body mass index; RR, relative risk. *BMI is calculated as weight in kilograms divided by height in meters squared. **Data are reported per 10,000 pregnancies. ***Two studies were excluded due to the model not converging when included. One study was excluded (59) because it provided only a continuous estimate.
Postpartum thyroiditis

- Thyroid dysfunction within 12 months of delivery
  - clinical evidence of hyperthyroidism, hypothyroidism, or both.
  - Transient autoimmune thyroiditis is found in approximately 5–10%
  - Challenging to diagnose

Symptoms of Postpartum Thyroiditis

- Decreased milk volume in breastfeeding women
- Painless goiter
- Hair loss
- Fatigue
- Depression, anxiety, and moodiness
Postpartum Thyroiditis

- 11% to 17% of women 1 to 3 months after delivery
- Infiltration of the thyroid with lymphocytes
- Antithyroid antibodies are found in 80% to 85% of patients
- Subclinical in ~60% of women
- ¾ it progresses to permanent hypothyroidism within 3 to 5 years
- Recurs in subsequent pregnancies 15%

Increased risk for women with:
- Type I DM
- Graves in remission and
- and chronic viral hepatitis

Postpartum Thyroiditis

- Because the prevalence of PPT in women with type 1 diabetes, Graves' disease in remission, and chronic viral hepatitis is greater than in the general population, screening by TSH is recommended at 3 and 6 months postpartum. USPSTF recommendation level: B
- Women with a history of PPT have a markedly increased risk of developing permanent primary hypothyroidism in the 5- to 10-yr period after the episode of PPT. An annual TSH level should be performed in these women. USPSTF recommendation level: A
Neonatal Lupus

Within 10 years of the birth of a child with congenital heart block, 60% of mothers without identifiable disease in the index pregnancy develop an autoimmune disease, usually Sjogren syndrome.

Neonatal Lupus
(absence of maternal disease)

- Leukopenia
- Anemia
- Thrombocytopenia
- Reversible skin rash
- Hepatosplenomegaly,
- Congenital heart block
  - anti-Ro antibodies
Intrahepatic Cholestasis

- **Diagnosis:**
  - Serum bile acids >14
  - Deposition in the **Purkinje fibers** causing fetal heart block and sudden fetal death
  - Delivery at 36-37 weeks

**Follow up**
- Labs postpartum should assess for resolution; if not look for other liver pathology
- Drugs that trigger cholestasis in those with a history include erythromycin, flucloxacillin, and amoxicillin–clavulanic acid.
- History of ICP should be advised to use hormonal contraception with care, because there is a 10% chance of developing pruritus or hepatic impairment
Intrahepatic Cholestasis

Although the genetic basis for the connections between ICP and gallstones remains to be resolved, women with a history of ICP are at greater risk of developing gallstones later in life.

Breastfeeding
Breastfeeding: Key messages

What is already known about this subject?
- Pregnancy poses a substantial challenge to cardiovascular system of the mother and breastfeeding might reverse some of these changes.
- The direction and magnitude of the associations between parity, breastfeeding, and their combined effects, and the risk of coronary heart disease (CHD) are uncertain.

What does this study add?
- Compared with nulliparous women, parous women were at a 20% increased risk of CHD and that the excess risks increased with increasing number of children.
- Breastfeeding was associated with a reduced the risk of CHD of 30%, compared with parous women who did not breastfeed.
- Compared with nulliparous women, childbearing was only associated with an increased risk of CHD among women who had never breastfed. This is despite the higher number of children among women who had ever breastfed.

How might this impact on clinical practice?
- Breastfeeding might reverse the physiological changes in pregnancy more quickly and more completely.
- If causal, promotion of prolonged breastfeeding in parous women may confer long-term cardiovascular benefit.

Conclusions from the American College of Obstetricians and Gynecologists

- Breastfeeding has important short-term and long-term health benefits for the woman.
- Cardiac patients should be encouraged to breastfeed during the postpartum hospital stay and in the outpatient setting because most medications are considered safe.
- Breastfeeding has favorable effects not only on hypertension through positive effects on the maternal vasculature but fosters a favorable lipid and hormonal milieu along with improved mother-infant bonding.
- Women whose cumulative lifetime duration of breastfeeding is 6–12 months are 10% less likely to develop cardiovascular disease.
Table 3. Cardiac Medications With Potential Pregnancy and Lactation Influence

<table>
<thead>
<tr>
<th>Drug</th>
<th>Teratogenic</th>
<th>Fetal Effects</th>
<th>Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antiarrhythmic Agents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disopyramide</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible, may inhibit prolatin release</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible, may reduce neonatal mortality</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>No</td>
<td>No adverse fetal effects when used cautiously</td>
<td>Probably compatible</td>
</tr>
<tr>
<td><strong>Vasodilators</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>Yes</td>
<td>Potentially fatal neonatal toxicity with high doses</td>
<td>Possibly hazardous</td>
</tr>
<tr>
<td>Hydralazine</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Possibly compatible</td>
</tr>
<tr>
<td><strong>Alpha-Adrenergic Blockers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenylpropanolide</td>
<td>Yes</td>
<td>Potentially fatal cardiac toxicity in utero</td>
<td>Possibly hazardous</td>
</tr>
<tr>
<td><strong>Angiotensin Converting Enzyme Inhibitors and Angiotensin Receptor Blockers</strong></td>
<td>Yes</td>
<td>Concomitantly associated with fetal renal failure, growth restriction, malformations and death</td>
<td>Possibly hazardous with chronic use</td>
</tr>
<tr>
<td><strong>Beta-blockers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propranolol</td>
<td>No</td>
<td>May increase risk of growth restriction</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Labetalol</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Metoprolol</td>
<td>No</td>
<td>May increase risk of growth restriction</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Esmolol</td>
<td>Yes</td>
<td>May cause fetal bradycardia</td>
<td>Probably compatible</td>
</tr>
<tr>
<td><strong>Calcium Channel Blockers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verapamil</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Nifedipine</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td><strong>Nitrate Inhibitors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium Nitroprusside</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
</tbody>
</table>

**Antihypertensive Agents**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Teratogenic</th>
<th>Fetal Effects</th>
<th>Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lidocaine</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible, may inhibit prolatin release</td>
</tr>
<tr>
<td>Procainamide</td>
<td>Yes</td>
<td>Limited human information</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Phenytoin</td>
<td>Yes</td>
<td>Limited human information</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>Yes</td>
<td>Limited human information</td>
<td>Possibly compatible</td>
</tr>
<tr>
<td>Diltiazem</td>
<td>No</td>
<td>Limited human information</td>
<td>Possibly compatible</td>
</tr>
<tr>
<td>Sotalol</td>
<td>No</td>
<td>Limited human information</td>
<td>Possibly compatible</td>
</tr>
</tbody>
</table>

**Antiplatelet Agents**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Teratogenic</th>
<th>Fetal Effects</th>
<th>Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>No</td>
<td>Limited human information</td>
<td>Limited information</td>
</tr>
<tr>
<td>Dipyridamole</td>
<td>Yes</td>
<td>No adverse fetal effects</td>
<td>Limited information</td>
</tr>
<tr>
<td>Ticlopidine</td>
<td>No</td>
<td>Limited human information</td>
<td>Limited information</td>
</tr>
<tr>
<td>Ticagrelol</td>
<td>No</td>
<td>Limited human information</td>
<td>Limited information</td>
</tr>
</tbody>
</table>

**Air Pore Blocking Agents**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Teratogenic</th>
<th>Fetal Effects</th>
<th>Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digoxin</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Anticoagulants and Anti-Thrombotics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warfarin</td>
<td>Yes</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Low-molecular-weight heparin</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Unfractionated heparin</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>No</td>
<td>Limited human information</td>
<td>Possibly compatible</td>
</tr>
</tbody>
</table>

**Direct Factor IXa Inhibitors (Rivaroxaban or edoxaban)**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Teratogenic</th>
<th>Fetal Effects</th>
<th>Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rivaroxaban</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Possibly compatible</td>
</tr>
<tr>
<td>Edoxaban</td>
<td>No</td>
<td>No adverse fetal effects</td>
<td>Probably compatible</td>
</tr>
</tbody>
</table>

**Glucocorticoids**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Teratogenic</th>
<th>Fetal Effects</th>
<th>Breastfeeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrocortisone</td>
<td>No</td>
<td>Limited human information</td>
<td>Limited information</td>
</tr>
<tr>
<td>Fludrocortisone</td>
<td>No</td>
<td>Limited human information</td>
<td>Limited information</td>
</tr>
</tbody>
</table>

**References**

- [https://www.ahajournals.org/doi/epub/10.1161/HYPERTENSIONAHA.117.09246](https://www.ahajournals.org/doi/epub/10.1161/HYPERTENSIONAHA.117.09246)
- [https://www.ahajournals.org/doi/epub/10.1161/HYPERTENSIONAHA.117.09246](https://www.ahajournals.org/doi/epub/10.1161/HYPERTENSIONAHA.117.09246)