MEDICAL COMPLICATIONS AND PREGNANCY

Providing care for women with preexisting medical conditions in pregnancy

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DISCLOSURES

- I have no conflicts of interest to report regarding this presentation.

MEDICAL CO-MORBIDITIES OF PREGNANCY

- Heart transplant
- Mitral stenosis
- Mitral insufficiency
- Mitral valve prolapse
- Aortic stenosis
- Aortic insufficiency
- Pulmonic stenosis
- Atrial septal defects
- Ventricular septal defects
- Patent ductus arteriosus
- Cyanotic heart disease
- Repair of CHD
- Pulmonary hypertension
- Eisenmenger syndrome
- Hypertrophic cardiomyopathies
- Dilated cardiomyopathy
- Peripartum Cardiomyopathy
- Heart Failure
- Infective endocarditis
- Bradyarrthyhmias
- Supraventricular tachycardias
- Ventricular tachycardia
- Prolonged QT interval
- Aortic Dissection
- Aortic coarctation
- Ischemic heart disease
- Obesity
- Bariatric Surgery
- Asthma
- Tuberculosis
- Sarcoidosis
- Cystic Fibrosis
- Antithrombin deficiency
- Protein C deficiency
- Protein S deficiency
- Factor V Leiden mutations
- Prothrombin G20210A mutation
- Antiphospholipid syndrome
- Superficial venous thrombophlebitis
- Nephrolithiasis
- Renal transplant
- Polycystic kidney disease
- Nephrotic syndromes
- Chronic kidney disease
- Gastroesophageal reflux disease
- Hiatal hernia
- Diaphragmatic hernia
- Achalasia
- Peptic ulcer disease
- Crohn’s disease
- Ulcerative colitis
- Ostomy
- Hepatitis A,
- Hepatitis B
- Hepatitis C
- Hepatitis D
- Hepatitis E
- Hepatitis G
- Autoimmune hepatitis
- Nonalcoholic fatty live disease
- Cirrhosis
- Portal hypertension and esophageal varices
- Focal nodular hyperplasia
- Hepatic adenoma
- Liver transplantation
- Cholelithiasis
- Pancreatitis
- Iron-deficiency anemia
- Anemia of chronic disease
- Megoblastic anemia
- Hemolytic anemia
- Sickle Cell Disease
- Alpha thalassemia
- Beta thalassemia
- Inherited thrombocytopenia
- Immune mediated thrombocytopenia
- Thrombocytosis
- Hemophilia A and B
- Von Willebrand Disease
- Diabetes Mellitus type I
- Diabetes Mellitus type II
- Hypothyroidism
- Hyperthyroidism
- Subclinical hypothyroidism
- Subclinical hyperthyroidism
- Nodular thyroid disease
- Hyperparathyroidism
- Hypoparathyroidism
- Pheochromocytoma
- Cushing syndrome
- Adrenal insufficiency
- Primary aldosteronism
- Renal transplant
- Polycystic kidney disease
- Nephrotic syndromes
- Chronic kidney disease
- Prolactinomas
- Acromegaly
- Diabetes insipidus
- Sheehan syndrome
- Lymphocytic hypophysitis
- Systemic lupus erythematous
- Rheumatoid arthritis
- Systemic sclerosis
- Polyarteritis nodosa
- Granulomatosis with polyangiitis
- Takayasu arteritis
- Henoch-Schonlein purpura
- Polymyositis
- Marfan syndrome
- Ehlers Danlos syndrome
- Osteogenesis imperfecta
- Migraines
- Epilepsy
- Multiple sclerosis
- Huntington disease
- Myasthenia gravis
- Guillain-Barre syndrome
- Bell palsy
- Carpal tunnel syndrome
- Spinal cord injury
- Idiopathic intracranial hypertension
- Cervical cancer
- Breast cancer
- Thyroid cancer
- Lymphoma (Hodgkin/Non-Hodgkin)
- Leukemia
- Melanoma
- Colon cancer
- HIV

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OPTIMIZATION BEFORE PROCREATION

Providing care for women with *common* preexisting medical conditions *prior to* pregnancy

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OBJECTIVES

Upon completion of this educational activity, participants will understand…

1. Physiologic changes in pregnancy and how they relate to preexisting medical comorbidities.
2. Common preexisting medical comorbidities and their associated pregnancy risk.
3. How women with medical comorbidities are counseled on medication use in pregnancy
4. Their role before and after pregnancy in women with preexisting medical comorbidities.
5. Caring for women with medical complications is a team game.

A PREGNANCY DREAM

Creation Hill from Pexels

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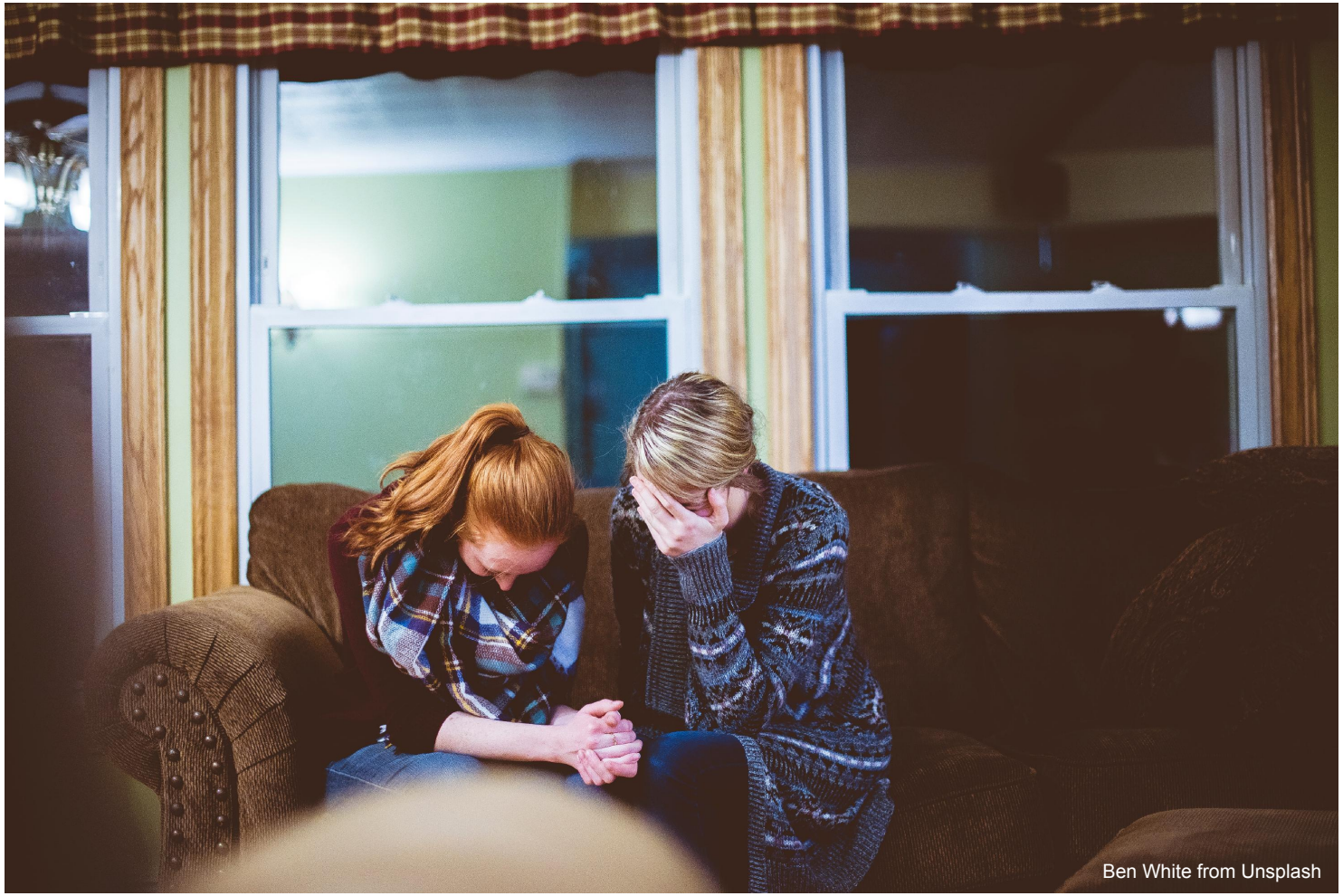
A PREGNANCY REALITY



A PREGNANCY REALITY

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PREGNANCY IS STRESSFUL

- Preexisting predispositions associated with long-term chronic disease are unmasked during a physiological stressful time (i.e. pregnancy) which can lead to adverse pregnancy outcomes.

"Pregnancy as a Window to Future Health"

PREGNANCY IS STRESSFUL

- Preexisting predispositions associated with long-term chronic disease are unmasked during a physiological stressful time (i.e. pregnancy) which can lead to adverse pregnancy outcomes.

"Pregnancy as a Window to Future Health"

- Women who already have these long-term chronic diseases don't need unmasking and when pregnancy does occur, the added stress can often lead to adverse pregnancy outcomes.

"Pregnancy as a Catalyst to Worsening Health"

PHYSIOLOGY OF PREGNANCY

PREGNANCY PHYSIOLOGY

- Energy demand will increase 20% (30% in twins)

In order to meet these demands the body must compensate

- Average weight gain is 27.5 lbs
  - Majority of weight due to natural expansion of uterus, blood volume, fetus and placenta
  - Hyperlipidemia (triglycerides, HDLs and LDLs)
  - Increased insulin resistance hyperinsulinemia
  - Fasting hypoglycemia, postprandial hyperglycemia

IT'S ALL ABOUT PROGESTERONE

- Increased blood volume (plasma > RBCs = decreased Hgb)
- Increased vasodilation
  - Decreased systemic vascular resistance decreased blood pressure
  - Increased heart rate (100 is upper limit of normal)
  - Increased cardiac output (up to 50% while pushing in labor).
- Hypercoagulable state
  - Increased: Factors I, II, V, VII, VIII, X and XII, fibrinogen, D-dimer (not useful in clinical decision making)
  - Decreased: Factors XI, XIII, protein S
- Respiratory compensation
  - Increase in minute ventilation decrease in functional residual capacity
    - Increase in PaO_2 & PAO_2 & a decrease in $PaCO_2$

IT'S ALL ABOUT PROGESTERONE

- Increased renal perfusion (~50%)
  - Increase GFR decrease serum Cr (>0.9 mg/dL is abnormal)
  - Increase excretion
    - Sodium = hyponatremia (<130 mEq/L is abnormal)
    - Protein = proteinuria (>200 mg/day is abnormal)
    - Glucose = glucosuria
    - Bicarbonate (HCO_3) = respiratory compensation (<16 mEq/L is abnormal)
- Respiratory alkalosis (<7.40 is abnormal)
- Other lab changes
  - Increased WBCs (<5.5 & >17.0 is abnormal)
  - Decreased platelets (<150k is abnormal)
  - Increased alkaline phosphatase (>200 is abnormal)

COMMON CONDITIONS SEEN IN PREGNANCY

The MFM triad

OBESITY

- Similar nomenclature - based on pre/early pregnancy BMI
  - Normal (BMI 18.5 to 24.9 kg/m^2)
  - Overweight (BMI 25.0 to 29.9 kg/m^2)
  - Obese class I (BMI 30.0 to 34.9 kg/m^2)
  - Obese class II (BMI 35.0 to 39.9 kg/m^2)
  - Obese class III (BMI >40.0 kg/m^2)
    - Morbid (BMI 40.0 to 49.9 kg/m^2)
    - Supermorbid (BMI >49.9 kg/m^2)
- Approx. 36% of reproductive age women have BMI > 30
- Risk of adverse outcomes progresses with increasing BMI
- More likely to experience hormonal contraception failure

OBESITY

- *Long term risk of pregnancy*
  - Pregnancy is a “natural” weight gaining process.
  - Difficulty returning to pre-pregnancy weight and further weight loss beyond
- *Maternal risk:*
  - gestational diabetes, hypertensive diseases of pregnancy, obstructive sleep apnea, anxiety, death
  - anesthesia difficulties, dysfunctional labor resulting in cesarean delivery
  - wound infections, thromboembolisms and postpartum depression

OBESITY

- *Fetal/Neonatal/Child risk*
  - congenital anomalies (cardiac/neural tube), multiples, preterm birth (indicated/spontaneous) and the associated risk of prematurity, stillbirth
  - large for gestational age, hypoxic ischemic encephalopathy, ventilator support, neonatal death
  - asthma, childhood obesity, neurodevelopmental delays

OBESITY

- Contraindications (relative)
  - Ideally, a goal BMI of <30 prior to pregnancy
  - No ART for BMI >40

- *Pregnancy management*:
  - Any weight reduction prior to conception decrease complications
  - A weight gain not to exceed 20 lbs. during pregnancy
  - Exercise (light to moderate) 30 minutes a day 4-5x a week
  - Detailed anatomy scan with maternal-fetal specialist
  - Full term delivery (>39 weeks) unless complications arise

HISTORY OF BARIATRIC SURGERY

- All risk are increased compared to normal weight women, but decreased compared to obese women
- *Long term risk of pregnancy*
  - Pregnancy often halts/reverses weight loss that occurs with bariatric surgery
- *Maternal risk:*
  - anemia, nutrition deficiency, intestinal herniation, bowel obstruction and GI hemorrhage
- *Fetal/Neonatal/Child risk*
  - preterm birth (indicated/spontaneous) and the associated risk of prematurity
  - small for gestational age, ICU admissions

HISTORY OF BARIATRIC SURGERY

- Contraindications
  - None
- *Pregnancy management*:
  - Any new complaints of abdominal pain and emesis be carefully evaluated for herniation
  - Avoid any further weight loss during pregnancy with weight gain not to exceed 20 lbs
  - Micronutrient supplementation and screening every trimester for iron, thiamine, B_{12}, folate, vitamin D and calcium citrate
  - Fetal growth ultrasounds starting in the third trimester
  - Full term delivery (>39 weeks) unless complications arise

CHRONIC HYPERTENSION

- Defined as BPs >140/90 or on oral antihypertensive medication prior to/in early pregnancy with no secondary causes identified.
  - If BP elevation increases during pregnancy (>20 weeks gestational age) it is diagnosed as gestational hypertension and will likely lead to preeclampsia.
- Complicates up to 5% of all pregnancies.
- Risk of adverse outcomes progresses with higher baseline blood pressure and/or the presence of end organ damage

CHRONIC HYPERTENSION

- *Long term risk of pregnancy*
  - Lower BPs in the 1st and 2nd trimester with slightly higher BPs in the 3rd
  - Any end-organ complications present can worsen with poor BP control (>160/105).
- *Maternal risk:*
  - Superimposed preeclampsia (up to 40%), placental abruption
  - Cesarean delivery

CHRONIC HYPERTENSION

- *Fetal/Neonatal/Child risk*
  - Congenital anomalies (cardiac/renal due to mediation exposure), fetal growth restriction, preterm birth (indicated/spontaneous) and the associated risk of prematurity, stillbirth
  - Low birth weight, ICU admissions, neonatal death
- Contraindications (relative)
  - persistent diastolic BPs >110 despite multiple agent therapy
  - serum Cr >2.0 mg/dL
  - history of cardiovascular or cerebrovascular disease attributive to hypertension

CHRONIC HYPERTENSION

- *Pregnancy management*:
  - Baseline labs assessing kidney function (help distinguish physiologic changes from preeclampsia)
  - Daily 81mg aspirin (decrease risk of preeclampsia)
  - If >10 year history EKG and if abnormal echo (screen for undiagnosed heart disease)
  - Discontinue ACE inhibitors/ARBs and transition to Labetalol or Nifedipine
  - BP goals <160/110 (decrease risk of end organ damage, but if already present <140/90).
    - CHAP trial: large RCT assessing treatment for mild hypertension (BPs 140-159/90-109)
  - Detailed anatomy scan with maternal-fetal specialist
  - Fetal growth ultrasounds and antenatal testing starting in the third trimester
  - Full term delivery (>39 weeks) unless complications arise or end organ damage present

PREGESTATIONAL DIABETES

- Classified as pregestational vs. gestational
- Pregestational further divided into
  - Type I and Type II
  - With or without vascular complications (and specifically which ones)
- Complicates up to 4% of all pregnancies.
  - Type II prevalence is increasing rapidly due to associated obesity
- The degree of underlying cardiovascular or renal compromise is more important that antepartum blood sugar control in determining the risk of adverse pregnancy outcomes.

PREGESTATIONAL DIABETES

- *Long term risk of pregnancy*
  - Any end-organ complications already present (nephropathy, retinopathy, neuropathy) will worsen during pregnancy with suboptimal glucose control.
  - Blood sugars difficult to manage given natural fasting hypoglycemia and postprandial hyperglycemia.
- *Maternal risk:*
  - diabetic ketoacidosis, hypertensive diseases of pregnancy, polyhydramnios
  - cesarean delivery

PREGESTATIONAL DIABETES

- *Fetal/Neonatal/Child risk*
  - congenital anomalies (cardiac/neural tube), fetal growth restriction, macrosomia, preterm birth (indicated/spontaneous) and the associated risk of prematurity, stillbirth
  - large for gestational age, birth trauma, respiratory distress, polycythemia, hyperinsulinemia->hypoglycemia, hypocalcemia, hyperbilirubinemia
  - obesity, type 2 diabetes
- Contraindications (relative)
  - Continual end organ damage due to uncontrolled or difficult to control blood sugars
  - Ideally, a goal A1C of <6.5% prior to conception to minimize risk of congenital anomaly

PREGESTATIONAL DIABETES

- *Pregnancy management*:
  - Consult with diabetic educator/nutritionist (discuss dietary changes for pregnancy)
  - Tight glycemic control (readings needed >4x/day to achieve optimal control)
    - Goals are fasting <95mg/dL, postprandial <140/120mg/dL at 1/2hrs, respectively.
  - If >10 year history EKG and if abnormal echo (screen for undiagnosed heart disease)
  - Detailed anatomy scan and fetal echocardiogram with maternal-fetal specialist.
  - Fetal growth ultrasounds and antenatal testing starting in the third trimester.
  - If no complications a full term delivery (>39 weeks) can occur, but often times will deliver in the early term 37-38 weeks for difficult to control or end organ damage.

HOW CAN YOU IMPROVE PREGNANCY OUTCOMES?

WAYS TO HELP

1. Support appropriate medication use
2. Assist with contraception counseling
3. (Re)Establish care soon after delivery

COMMON MEDICATIONS TO AVOID

- Thalidomide
- Isotretinoin
- Methotrexate
- ACE inhibitors/ ARBs
- Hormonal replacement therapy
- Oral contraceptives

FORMER MEDICATION CATEGORIES

- A: controlled studies show no risk or find no evidence of harm
- B: animal studies show no risks, but there are no controlled studies on pregnant women
- C: animal studies show no risks, there are no controlled studies on pregnant women, *or* studies on animal or woman are not available
- D: there is positive evidence of potential fetal risk, but the benefits from use in pregnant woman may be acceptable
- X: animal or human studies have demonstrated fetal abnormalities or there is evidence of fetal risk. This drug is contraindicated in women who are or may become pregnant.

PROBLEM WITH CATEGORIES

- Most medications get put into category C because of limited studies on pregnant women.
- Certain medications can switch classes due to new findings of increasing risk of harm yet previously showed benefit
  - Magnesium sulfate (category A category D)
    - Harm: use more than 5 days associated with neonatal hypocalcemia and bone fractures
    - Benefit: exposure prior to early preterm birth (<32 weeks) decreases risk and severity of cerebral palsy
- Individualized care not taken into consideration
  - Mental health conditions

INDIVIDUALIZED MEDICATION USE

- Warfarin (formerly class X)
- Now counseling would go:
  - Secondary to the known baseline risk of 3% for congenital anomalies, approximately 1% of all teratogen-related anomalies can be attributed to the use of pharmaceutic agents.
  - However, it is difficult to definitively determine any medication as being "safe" in pregnancy as infants who are exposed are rarely if ever monitored throughout their lives.
  - Regarding Warfarin, its use increases the risk of structural malformations when used during organogenesis, the first trimester. Other adverse pregnancy outcomes such as maternal hemorrhage and intracranial fetal bleeding can also occur. Its use should be limited in cases at risk of severe maternal morbidity, such as women with mechanical heart valves in the latter half of pregnancy.

MEDICATIONS MANAGEMENT

- DON'T STOP A MEDICATION JUST BECAUSE A WOMEN IS PREGNANT (unless it is always avoided).
- Most medications aren't considered safe in pregnancy due to a lack of data, not because of known harm.
  - If there is an alternative that has been studied and deemed safe then a switch is preferred.
    - Example: Lovenox from Xarelto in a women with recurred VTEs.
  - If there are no alternatives with a known safety profile keep her on it until she sees an obstetrician.
- If you have *any* medication questions, **ask an obstetrician!!**

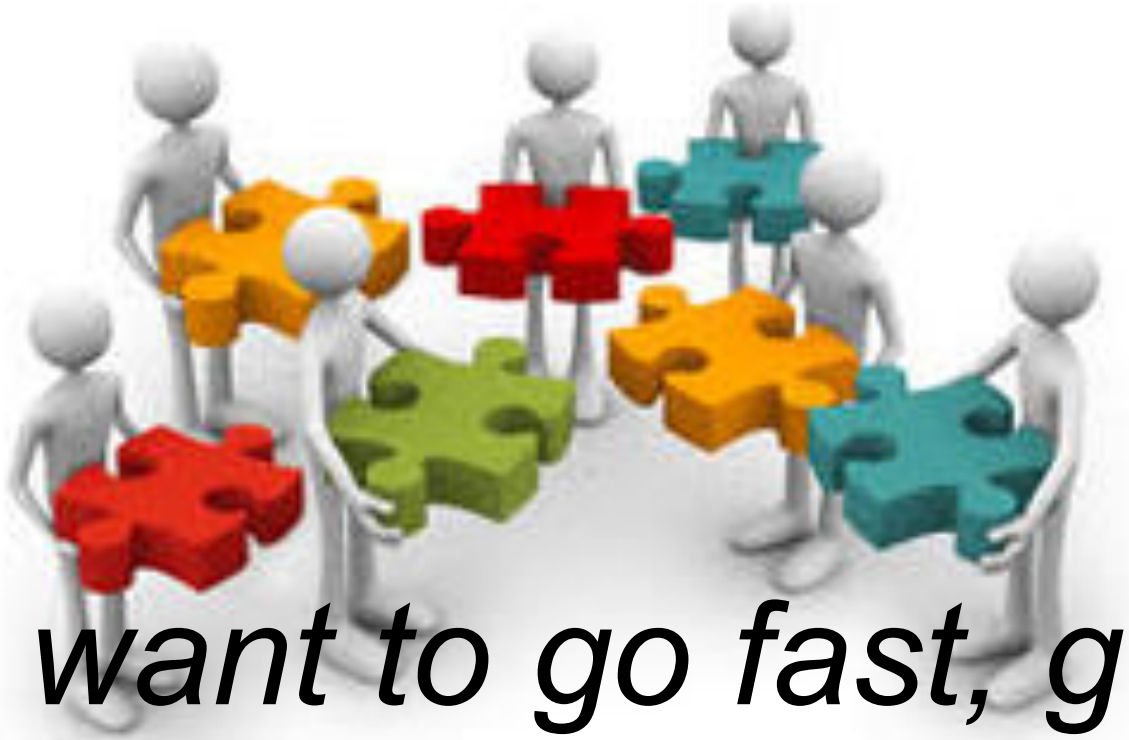
POSTPARTUM FOLLOW UP

- The “4th trimester” and challenges involved
  - Caring for a newborn, lack of sleep, breastfeeding difficulties, pain, stress, etc.
- Compounded in women who had a complicated pregnancy or have their own preexisting health problems to attend
- Physiologic changes can take up to 6 months to fully resolve.

POSTPARTUM FOLLOW UP

- Obstetricians must counsel patients on…
  - pregnancy complications and implications for future childbearing and long-term maternal health.
  - the importance of timely follow-up with their primary care provider.
- Primary care providers must review and discuss….
  - medication selection and dose outside of pregnancy
    - consider if patient is breastfeeding and appropriateness of meds (LactMed)
  - appropriate referrals to improve patients overall well being
    - weight loss clinic, exercise programs, mental health programs etc.

IT TAKES A VILLAGE



"If you want to go fast, go alone.

If you want to go far, go together."

- African proverb

REFERENCES

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- Creasy and Resnick's Maternal-Fetal Medicine (7th ed).