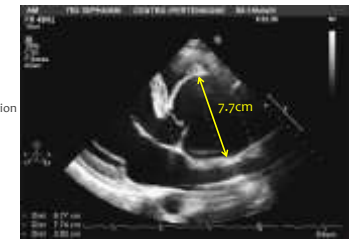
Case 1: *SB*

- 23yo female with Marfan syndrome presents at 11 weeks EGA
- Medications:
  - Metoprolol
  - Prenatal vitamin
- Echocardiogram:
  - Normal LV size and function
  - Mild aortic insufficiency
  - And…



Case 1: *SB continued…*

- Case presented before the Pregnancy & Heart Conference
  - High risk for aortic rupture
  - Cardiac surgery recommended
- Aortic root replacement performed at 13 weeks EGA
- Post-operative course complicated by spontaneous miscarriage
  - D&C performed on POD #4

Comprehensive Management *of the Obstetric Patient with Cardiac Disease*

Drs. Luisa Wetta & Marc Cribbs
43rd annual Progress in OB/Gyn Conference
February 15th, 2018

Disclosures

- Dr. Wetta has no relevant financial relationships or conflicts of interest to disclose
- Dr. Cribbs has no relevant financial relationships or conflicts of interest to disclose

Comprehensive Management *of the Obstetric Patient with Cardiac Disease* outline

- Pregnancy & Heart disease: *a growing population*
- Cardiac physiology in pregnancy
- Risk assessment
- Management considerations

Comprehensive Management *of the Obstetric Patient with Cardiac Disease* educational objectives

- Describe the prevalence of heart disease in pregnancy
- Describe the physiologic changes of pregnancy, labor & delivery, and the post-partum period in regards to the cardiovascular system
- Describe the different risk assessments in pregnant women with heart disease
- Review management recommendations for pregnant women with heart disease
- Understand when to refer pregnant women to the Pregnancy and Heart Disease Program

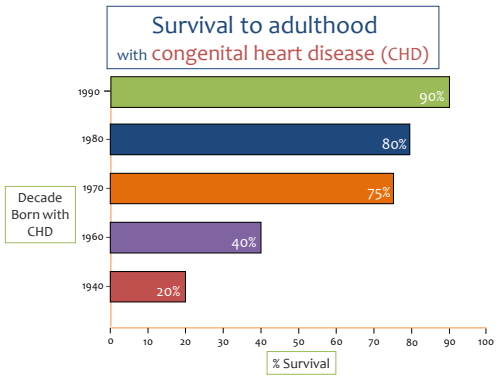
What are the goals?

- Maintain the wellness of women with heart disease
- Enable a safe pregnancy
  - *When it is safe to pursue*
- Help ensure mother *and* child are healthy

Pregnancy & Heart disease
a growing population

Pregnancy & Heart Disease

- Women with heart disease are increasingly seen in OB offices
  - Complicates 1 to 4% of pregnancies in the US
- Many women are postponing pregnancy until later in life
  - Hypertension
  - Diabetes
  - Hyperlipidemia
  - Coronary artery disease (CAD)
- Major cause of non-obstetric maternal morbidity and mortality
  - Rheumatic heart disease<<< **Congenital Heart Disease**



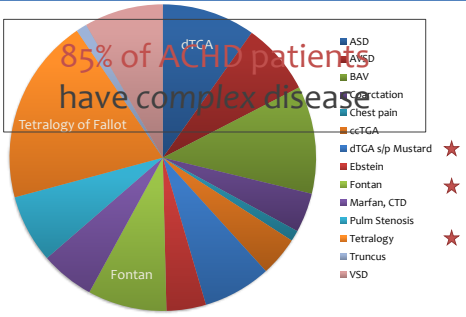
Warnes CA, et al. *J Am Coll Cardiol*. 2001;37(5):1170-1175.
Moons P et al. *Circulation* 2010.122:2264-2272

Today, survival is expected
– *from the crib to old age*

More adults than children living with congenital heart disease

Alabama *Adult Congenital Heart Program*

distribution of CHD lesions



Pregnancy & Heart Disease

- Each patient's circumstances are *unique*
- Educating the patient is incredibly helpful
- But…

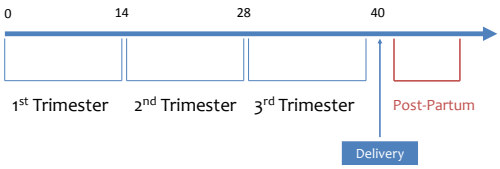
…since 60% of patients are lost to follow-up by age 18…

…preconception counseling isn't always possible.

Mackie, et al. *Circulation*. 2009;120:302-309.

Cardiac physiology *in pregnancy*

40 weeks



Anticipated changes *during pregnancy*

- Development of a "relative anemia"
- Changes in the circulatory system
  - Decrease in peripheral vascular resistance
- Increase in heart rate
  - Particularly in the 3rd trimester
- Increase in cardiac output by 30-50%

Anticipated changes *during labor*

C-section *does it help?*

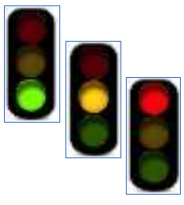
- Can potentially decrease:
  - Anxiety & pain
  - Stress related to contractions
- Possibility of added risk(s):
  - Anesthesia
  - Increased blood loss
  - Mechanical ventilation
  - ***Rarely*** indicated

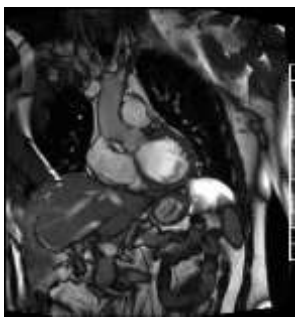
Changes *after delivery*

- Increase in preload from the lower body
- Blood loss
- Continued increase in cardiac output
- Riskiest time for pulmonary edema
- Ongoing fluid shifts for several days

Risk *assessment*

"So, what is my risk for heart problems?"





World Health Organization (WHO class)

Class 1 (low risk)

- Small or no increased risk and medical care as that of a woman with no heart disease
  - Pulmonary stenosis
  - Ventricular septal defect
- Successfully repaired "simple" lesions
  - Atrial septal defect
  - Ventricular septal defect

WHO Class 2-3 (intermediate risk)

- Increased risk for problems for mother and/or unborn child
- Risk may be manageable with medications, procedures, and/or specialized care

Class 2 ← Class 2-3 → Class 3

Class 2	Class 2-3	Class 3
UNrepaired ASD	Mild LV dysfunction	Mechanical valve
Repaired Tetralogy of Fallot	Hypertrophic cardiomyopathy	Transposition
Most rhythm issues	Tissue valve replacement	Single ventricle s/p Fontan
	Marfan *without* aortic dilation	Cyanosis

Thorne S, MacGregor A, Nelson-Piercy C. Risks of Contraception and Pregnancy in Heart Disease. Heart. 92: 1520-25. 2006.

WHO Class 4 (high risk)

- Probably / definitely high risk of health problems, miscarriage, and/or death for the mother
- Ventricular dysfunction
- Often difficult to manage, even with best possible care
- History of peripartum cardiomyopathy
- Severe valvular stenosis
- Marfan syndrome: aorta >4 cm

CARPreg score
(CAnadian Registry of Pregnancy)

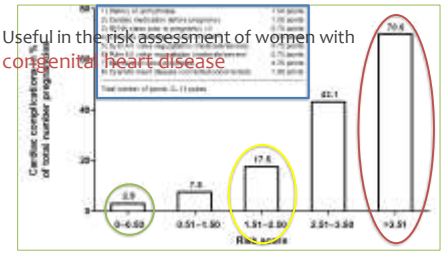
- History of:
  - Heart failure
  - Stroke or TIA
  - Arrhythmia
- NYHA functional class III-IV
- Cyanosis:
  - SpO2 <88%
- Significant valvar stenosis
- Ventricular dysfunction

CARPreg Score
0: 5% risk of cardiac event
1: 27%
>1: 75%

Siu SC et al. Prospective multicenter study of pregnancy outcomes in women with heart disease. Circulation. 104; 515-21. 2001.

ZAHARA Score

- Useful in the risk assessment of women with congenital heart disease



Drenthen W et al. Eur Heart J 2010;31:2124-2132

Estimated Risk *and where to deliver*

- Community hospital:
  - WHO class I
  - CARPreg score = 0
  - ZAHARA score <1.5

- Regional center:
  - WHO class 2-4
  - CARPreg score 1+
  - ZAHARA score >1.5

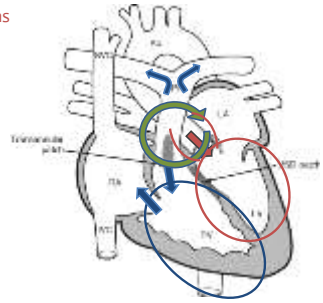
Risk *assessment*
example

Case 2: *BC*

- 24yo female with a history of
  - Tetralogy of Fallot
  - S/P "repair"
- NYHA Class II symptoms
- Metoprolol (palpitations)
- Presents to discuss having a baby

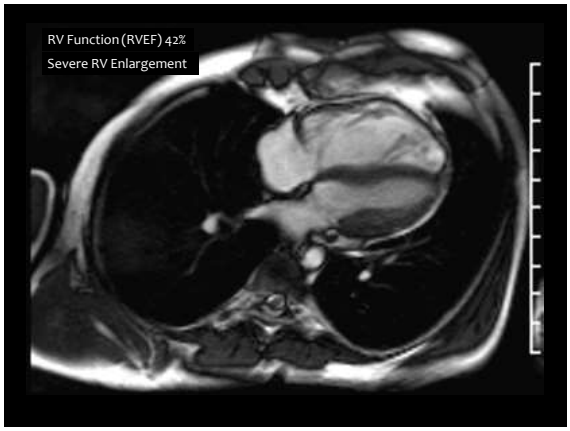
Tetralogy of Fallot
"repair"

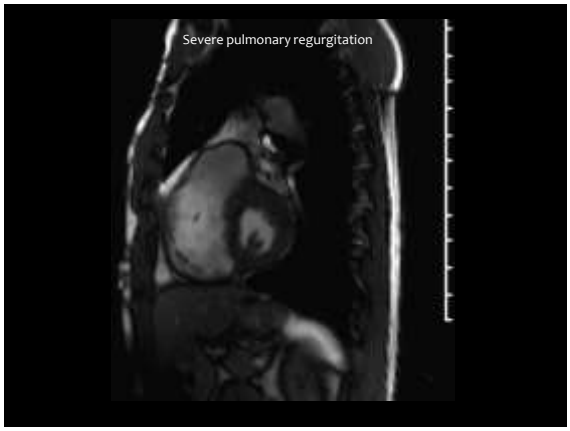
- Long-term complications are common:
  - Pulmonary insufficiency
  - Right ventricular enlargement
  - RV dysfunction
  - Tricuspid insufficiency
  - LV dysfunction
  - Branch PA stenosis
  - Arrhythmia (atrial & ventricular)
  - Aortic insufficiency
  - Aortic root enlargement
  - Sudden cardiac death



Case 2: *BC continued…*

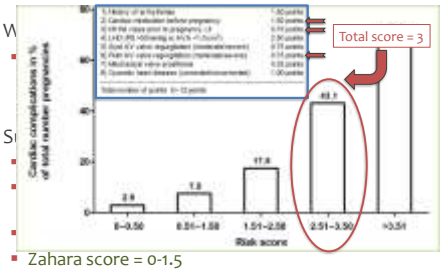
- 24yo female with Tetralogy of Fallot
  - s/p "repair" as a baby
- NYHA Class II symptoms
- Metoprolol (palpitations)
- Presents to discuss having a baby
- Echocardiogram:
  - Severe pulmonary insufficiency
  - Right ventricle hard to visualize





Risk assessment applied...

- W
- S
  - Zahara score = 0-1.5
    - Risk = 2.9-7.5%



Management *considerations*

Before pregnancy!

"When should I be evaluated?"

"Why *before* pregnancy?"

- Many tests and procedures are more safely done
- Optimize the patient's health prior to getting pregnant
- Ensure medications are safe

UAB Comprehensive Pregnancy & Heart Program

- Only one of its kind in the Southeast
- All aspects of care available (Medical Home)
- Multidisciplinary team approach:
  - MFM
  - Adult Congenital & Pediatric Cardiology
  - OB Anesthesia
  - Heart Failure/Pulmonary Hypertension
  - Genetics

"Who is involved in my care?"

Cardiology physicians
Maternal Fetal Medicine physicians
OB Anesthesia physicians
Labor & Delivery nurses

UAB Pregnancy & Heart Clinics

- Congenital Heart Disease & Pregnancy clinic
  - MFM and Adult Congenital Heart specialists
  - May, 2016
- Congestive Heart Failure & Pregnancy clinic
  - MFM and Heart Failure/Pulmonary Hypertension specialists
  - January, 2018

UAB Pregnancy & Heart Clinics

"What do you typically do?"

- Review history, medications, imaging, and recent events
- Physical exam, ECG, and echocardiogram
- Additional cardiac testing as needed
  - Heart rhythm monitor
  - Advanced imaging
  - Exercise stress test
  - Cardiac catheterization

UAB Pregnancy & Heart Clinics

"What do you typically do?"

- Establish the initial pregnancy and delivery plan
  - Coordinate care with the patient's local OB
- Contraception counseling

Multidisciplinary conference

- Meet *each* month
- Discuss *each* patient who is currently pregnant
- Review their history, recent imaging, and exam
- Formulate optimal plan of care and delivery

Pregnancy & *Heart list*

Pt Info	Diagnoses	Imaging	Other diagnostics	Delivery Plan

Comprehensive Management *of the Obstetric Patient with Cardiac Disease* take home points

- The population of pregnant women with heart disease is significant and growing
- One's cardiac physiology can be greatly affected by changes in the pregnancy, delivery, and post-partum periods
- Risk assessment is important and best done *PRIOR* to conception
- Management by a multispecialty team is often necessary

What are the goals?

- Help ensure mother *and* child are healthy

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