# MATERNAL RISKS FOR UNDERLYING CARDIOVASCULAR DISEASE: KEY CONSENSUS TABLES

Two recent review articles are excellent reference materials for clinicians caring for pregnant or postpartum women with cardiovascular disease.[1,2] The four tables reproduced below from their source publications are meant to serve as a reference guide for clinicians to quickly review expert opinions on outcomes for a broad range of cardiovascular disease. The tables represent national and international consensus documents, and typical of such expert views, may contain slight variations between them. The tables are reprinted here with permission from the publishers.

Please also see Table 1: Adult Congenital Cardiac Lesions: Management and Expected Outcomes in Pregnancy in the Toolkit chapter: *Clinician and Facility Resources for Caring for Women with Congenital or Other Cardiovascular Disease* on page 26 for additional reference.

## Table 2: Modified World Health Organization (WHO) Classification of Maternal Cardiovascular Risk: Application

| **WHO Pregnancy Risk Classification** (Risk of pregnancy by medical condition) | **Cardiovascular Conditions by WHO Risk Class** |
|---|---|
| **WHO Risk Class I**<br>*No detectable increased risk of maternal mortality and no or mild increase in morbidity.* | • Uncomplicated, small or mild<br>  ○ Pulmonary stenosis<br>  ○ Patient ductus arteriosus<br>  ○ Mitral valve prolapse<br>• Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage).<br>• Atrial or ventricular ectopic beats, isolated |
| **WHO Risk Class II** (If otherwise well and uncomplicated)<br>*Small increased risk of maternal mortality or moderate increase in morbidity.* | • Unoperated atrial or ventricular septal defect<br>• Repaired tetralogy of Fallot<br>• Most arrhythmias |
| **WHO Risk Class II or III** (Depending on individual)<br>*Risk as indicated in Class II (above) or Class III (below).* | • Mild left ventricular impairment<br>• Hypertrophic cardiomyopathy<br>• Native or tissue valvular heart disease not considered WHO I or IV<br>• Marfan syndrome without aortic dilatation<br>• Aorta <45 mm in aortic disease associated with bicuspid aortic valve<br>• Repaired Coarctation |
| **WHO Risk Class III**<br>*Significantly increased risk of maternal mortality or severe morbidity. Expert counseling required. If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth and the puerperium.* | • Mechanical valve<br>• Systemic right ventricle<br>• Fontan circulation<br>• Cyanotic heart disease (unrepaired)<br>• Other complex congenital heart disease<br>• Aortic dilatation 40-45 mm in Marfan Syndrome<br>• Aortic dilatation 45-50 mm in aortic disease associated with bicuspid aortic valve |
| **WHO Risk Class IV** (Pregnancy contraindicated)<br>*Extremely high risk of maternal mortality or severe morbidity; pregnancy contraindicated. If pregnancy occurs termination should be discussed. If pregnancy continues, care as for class III.* | • Pulmonary arterial hypertension of any cause<br>• Severe systemic ventricular dysfunction (LVEF <30%, NYHA III-IV)*<br>• Previous peripartum cardiomyopathy with any residual impairment of left ventricular function<br>• Severe symptomatic mitral or aortic stenosis<br>• Marfan syndrome with aorta dilated >45 mm<br>• Aortic dilation >50 mm in aortic disease associated with bicuspid aortic valve<br>• Native severe Coarctation |

*LVEF = left ventricular ejection fraction; NYHA = New York Heart Association

Table 2 reprinted here with permission from Regitz-Zagrosek V, Blomstrom Lundqvist C, Borghi C, et al. ESC Guidelines on the management of cardiovascular diseases during pregnancy: The task force on the management of cardiovascular diseases during pregnancy of the European Society of Cardiology (ESC). *European Heart Journal.* 2011;32(24):3147-3197.

**Table 3: Predictors of Major Cardiac Event in Pregnant Patients with Heart Disease***

| Predictor | Odds Ratio | 95% Confidence Interval | *P value* |
|---|---|---|---|
| ***Prior cardiac event or arrhythmia***<br>• Heart failure<br>• Transient ischemic attack<br>• Stroke before pregnancy | 6 | (3-14) | < .001 |
| ***New York Heart Association class greater than II or cyanosis*** | 6 | (2-22) | .009 |
| ***Left heart obstruction***<br>• Mitral valve area less than 2 $cm^2$<br>• Aortic valve area less than 1.5 $cm^2$<br>• Peak left vertical outflow tract gradient greater than 30 mm Hg by echocardiography | 6 | (3-14) | < .001 |
| ***Systemic ventricular dysfunction***<br>• Ejection fraction less than 40% | 11 | (4-34) | < .001 |

*Major cardiac event=pulmonary edema, arrhythmia requiring treatment, stroke, cardiac arrest, cardiac death; 0 predictor = 5% risk; one predictor = 27% risk; two or more predictors = 75% risk.

Table 3 reprinted here with permission from: Simpson LL. Maternal cardiac disease: Update for the clinician. *Obstetrics and Gynecology.* 2012;119(2 Pt 1):345-359. Data originally from Sui SC, Sermer M, Colman JM, Alvarez AN, Mercier LA, Morton BC, et al. Prospective multicenter study of pregnancy outcomes in women with heart disease. *Circulation* 2001; 104:515-21. Please contact Wolters Kluwer to re-use this content (http://journals.lww.com/greenjournal/Abstract/2012/02000/Maternal_Cardiac_Disease_Update_for_the_Clinician.21.aspx)

**Table 4: Risk of Dissection or Rupture Based on Aortic Root Size among Patients with Marfan Syndrome***

| Aortic Root Diameter (cm) | Risk of Dissection or Rupture |
|---|---|
| Less than 4 | 1% during pregnancy |
| 4 or more | 10% during pregnancy |
| 4.0-4.9 | 2% yearly rate |
| 5.0-5.9 | 3% yearly rate |
| 6 or more | 7% yearly rate |

*Data is extrapolated primarily from non-pregnant population.

Table 4 reprinted here with permission from: Simpson LL. Maternal cardiac disease: Update for the clinician. *Obstetrics and Gynecology.* 2012;119(2 Pt 1):345-359. Data originally from Elefteriades JA. Indications for aortic replacement. *Journal of Thoracic and Cardiovascular Surgery* 2010; 140 (suppl):S5-9; discussion S45-51.

**Table 5: Outcome of Subsequent Pregnancies after Peripartum Cardiomyopathy**

| History of Peripartum Cardiomyopathy | N | Congestive Heart Failure | Maternal Mortality | Preterm Delivery |
|---|---|---|---|---|
| Normalization of left ventricle function | 28 | 21% | 0 | 11% |
| Non-normalization of left ventricle function | 16 | 44% | 19% | 37% |

Table 5 reprinted here with permission from: Simpson LL. Maternal cardiac disease: Update for the clinician. *Obstetrics and Gynecology.* 2012;119(2 Pt 1):345-359. Data originally from Elkayam U, Tummala PP, Rao K, Akhter MW, Karaalp IS, Wani OR, et al. Maternal and fetal outcomes of subsequent pregnancies in women with peripartum cardiomyopathy. *New England Journal of Medicine* 2001: 344:1567-71.

REFERENCES

1. Regitz-Zagrosek V, Blomstrom Lundqvist C, Borghi C, et al. ESC Guidelines on the management of cardiovascular diseases during pregnancy: the Task Force on the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC). *Eur Heart J.* 2011;32(24):3147-3197.
2. Simpson LL. Maternal cardiac disease: update for the clinician. *Obstet Gynecol.* 2012;119(2 Pt 1):345-359.