

## Clinical Guidance

### Management of Cardiac Disease in Pregnancy

**Summary:** This document is intended as a quick reference tool for the management of cardiac disease in pregnancy for clinicians within the South West London & Surrey Heartlands Maternal Medicine Network.

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**1.0 Introduction**

Cardiovascular disease is present in up to 4% of all pregnancies and its incidence is rapidly rising. Congenital, inherited and acquired cardiovascular diseases are a major cause of maternal and neonatal morbidity and mortality.

**2.0 Scope**

The guideline covers the pre-conception, antenatal, intrapartum and postnatal care of women with known or newly diagnosed cardiac disease. It aims to provide information to the obstetric and midwifery staff, as well as the members of the multidisciplinary team involved in the care of these women. It also provides guidance for the flow of patients with cardiac disease across the South West London & Surrey Heartlands Maternal Medicine Network.

**3.0 Guidance**

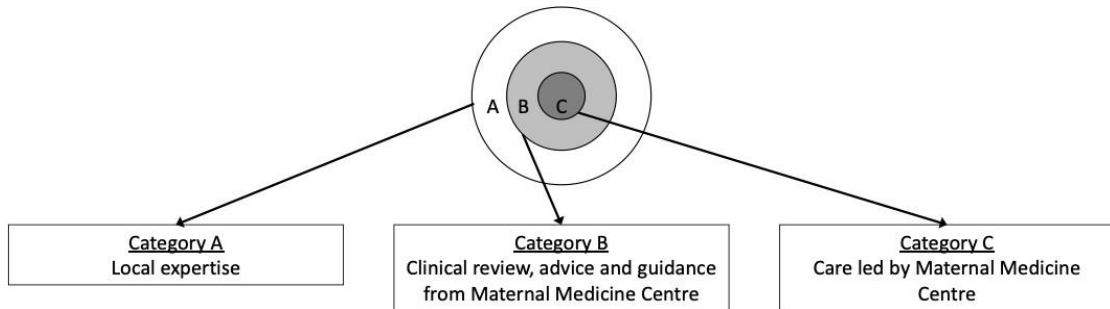
Risk Stratification of Cardiac Disease in Pregnancy					
	Category A		Category B	Category C	
	Local Expertise		Clinical Review, Advice & Guidance from MMC at St. George's Hospital	Care led by MMC at St. George's Hospital	
<b>Location of Delivery</b>	Local		As deemed appropriate following clinical review	MMC at St. George's Hospital or another MMC as deemed appropriate	
<b>Risk</b>	No detectable increased risk of maternal mortality and no/mild increased risk in morbidity	Small increased risk of maternal mortality or moderate increase in morbidity	Intermediate increased risk of maternal mortality or moderate to severe increase in morbidity	Significantly increased risk of maternal mortality and severe morbidity	Extremely high risk of maternal mortality or severe morbidity
<b>Maternal Cardiac Event Rate</b>	2.5-5%	5.7-10.5%	10-19%	19-27%	40-100%
<b>mWHO Category</b>	mWHO I	mWHO II	mWHO II-III	mWHO III	mWHO IV
<b>Minimal follow up visits during pregnancy</b>	Once or twice	Once per trimester	Every 2 months	Monthly or every 2 months	Monthly

	<p>Small or mild          – pulmonary stenosis          – patent ductus arteriosus          – mitral valve prolapse</p> <p>Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage)</p> <p>Atrial or ventricular ectopic beats, isolated</p> <p>Postural tachycardia syndrome (PoTS)</p>	<p>Unoperated atrial or ventricular septal defect</p> <p>Repaired tetralogy of Fallot</p> <p>Supraventricular arrhythmias</p> <p>Turner syndrome without aortic dilatation</p>	<p>Mild left ventricular impairment (EF &gt;45%)</p> <p>Hypertrophic cardiomyopathy with no high-risk features</p> <p>Native or tissue valve disease not considered mWHO I or IV (mild mitral-moderate aortic stenosis)</p> <p>Marfan or other HTAD syndrome without aortic dilatation</p> <p>Aorta &lt;45 mm in bicuspid aortic valve pathology</p> <p>Repaired coarctation</p> <p>Atrioventricular septal defect</p> <p>Repaired Tetralogy of Fallot</p> <p>Treated ischaemic heart disease.</p> <p>Myocarditis</p>	<p>Moderate left ventricular impairment (EF 30–45%)</p> <p>Previous peripartum cardiomyopathy without any residual left ventricular impairment</p> <p>Mechanical valve</p> <p>Systemic right ventricle with good or mildly decreased ventricular function</p> <p>Fontan circulation if otherwise the patient is well and the cardiac condition uncomplicated</p> <p>Unrepaired cyanotic heart disease</p> <p>Moderate mitral stenosis</p> <p>Severe asymptomatic aortic stenosis</p> <p>Moderate aortic dilatation (40–45 mm in Marfan syndrome or other HTAD; 45–50 mm in bicuspid aortic valve, Turner syndrome ASI 20–25 mm/m<sup>2</sup>, tetralogy of Fallot &lt;50 mm)</p> <p>Ventricular tachycardia</p>	<p>Pulmonary arterial hypertension</p> <p>Severe systemic ventricular dysfunction (EF &lt;30% or NYHA class III–IV)</p> <p>Previous peripartum cardiomyopathy with any residual left ventricular impairment</p> <p>Severe mitral stenosis</p> <p>Severe symptomatic aortic stenosis</p> <p>Systemic right ventricle with moderate or severely decreased ventricular function</p> <p>Severe aortic dilatation (&gt;45 mm in Marfan syndrome or other HTAD, &gt;50 mm in bicuspid aortic valve, Turner syndrome ASI &gt;25 mm/m<sup>2</sup>, tetralogy of Fallot &gt;50 mm)</p> <p>Vascular Ehlers–Danlos</p> <p>Severe (re)coarctation</p> <p>Fontan with any complication</p> <p>Heart transplant</p>
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				New ischaemic heart disease	
<p>Pulmonary hypertension (PH) in pregnancy requires specialised care. Treatment typically involves multiple targeted therapies managed by a nationally recognised PH center. Pregnant women with PH should be treated at a facility with co-located Obstetrics, Cardiology, ICU, and Neonatal ICU services. Patients will be seen at St Georges Hospital by PH specialist consultant in the first instance, and then may be directed to St Thomas' Hospital (particularly for Adult Congenital Heart Disease complications) or Queen Charlotte/Hammersmith Hospital, depending on the specific case.</p>					

**Process**

- This process is not prescriptive, an individualised approach should be followed, taking into consideration the available local expertise and the patient's cardiac condition.
- Women who meet the criteria for the maternal medicine pathway shall be identified at self-referral, booking or at any point in the antenatal care pathway.
- Where local expertise is insufficient, when a condition progresses or increases in severity during pregnancy, or when there is clinical concern, a condition should move from category A to B, or B to C.



- **Category A:** Women identified with maternal medicine requirements should have their named consultant identified within their maternity records. An individual plan of care should be documented in the management plan box in their maternity records including the need for specialist input from physicians, obstetric anaesthesia and allied health professionals.
- **Category B: (currently under a specialist cardiology team):** May be referred to their existing specialist team or the SGH obstetric/cardiac clinic, depending on the local team's assessment

**Category B: (not currently under a specialist cardiology team):** May be referred to the SGH obstetric/cardiac clinic if deemed necessary by the local team.

**Category B referred to SGH:** A member of the obstetric team is to complete a referral to the MMC via the Refer-a-Patient platform.

It is expected that following receipt of the referral the identified named consultant for Maternal Medicine at SWL & SH MMN will:

- Acknowledge receipt of the referral by return email within 24 hours, or within 72 hours (weekend and Bank Holiday).
- Provide a detailed letter outlining:
  - The plan of care for the rest of the pregnancy
  - Timing of further Echos or monitoring if required.
  - Agreed mode of delivery
  - Type of anaesthesia appropriate for use during delivery
  - Any specific recommendations for observations/fluid balance management during labour and postnatal period
  - Antibiotic requirements in labour (where required)
  - Anti-coagulation requirements (where appropriate)
  - Any medications that can be used in the 3<sup>rd</sup> stage of labour

- **Category C:** Any woman identified with significant cardiac conditions should be referred to the MMC via the Refer-a-Patient platform.
- **Category C (currently under a specialist cardiology team):** May be referred to their original cardiology team or to the SGH obstetric/cardiac clinic, as appropriate

In addition to the above the it is expected that the named consultant for Obstetric Cardiology at SWL & SH MMN will:

- Provide additional delivery plans agreed with the local Trust in the eventuality that the mother is unable to deliver at the tertiary unit.
- This is to include:
  - Detailed instructions on emergency transfer procedures where time permits
  - Agreed delivery indications and plans

A letter to communicate with the parent team and/or GP during each MMC review, along with a formal anesthetic plan and/or discharge summary, may be included in the Refer-a-Patient response.

- Provide additional delivery plans agreed with the local Trust in the eventuality that the mother is unable to deliver at the tertiary unit.
- This is to include:
  - Detailed instructions on emergency transfer procedures where time permits
  - Agreed delivery indications and plans

A letter to communicate with the parent team and/or GP during each MMC review, along with a formal anesthetic plan and/or discharge summary, may be included in the Refer-a-Patient response.

### Pre-pregnancy Counselling

Women with significant (mWHO II-III to IV) cardiac disease (inherited, congenital and acquired disease of the heart and major vessels) should be referred for pre-conception counselling at St. George's Hospital.

### Antenatal Care

Individualised antenatal follow-up plans should entail:

- The plan of care for the rest of the pregnancy
- Agreed pharmacotherapy and titration plans
- Timing of further echocardiograms or monitoring if required
- Agreed mode and timing of delivery
- Type of anaesthesia appropriate for use during delivery
- Any specific recommendations for observations, monitoring and fluid balance management during labour
- Antibiotic requirements in labour (where required)
- Anti-coagulation requirements (where appropriate)
- Any medications that can be used in the 3<sup>rd</sup> stage of labour

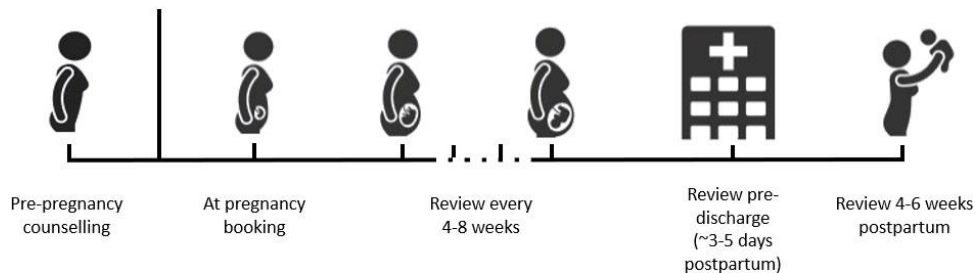
Delivery plans should be provided to the local Trust in the eventuality that the mother is unable to deliver at St. George's Hospital. This is to include:

- Detailed instructions on emergency transfer procedures where time permits
- Agreed delivery indications and plans

The following is a rough guide to minimal follow-up intensity: (this is not prescriptive, individualised follow up plan should be made depending on the clinical scenario and other co-morbidities)

- mWHO II: review in clinic at 8 -12 weeks, following fetal scan, and then once per trimester.
- mWHO II-III: review in clinic at 8 - 12 weeks, following fetal scan, and then every 8 weeks.
- mWHO III or IV: review in clinic as soon as possible after pregnancy is booked. Follow-up at least every 4-8 weeks.
- A plan for intrapartum and postnatal care is formulated at the clinic and often includes input from a consultant obstetric anaesthetist.

Follow-up of stable mWHO III-IV cardiac disease in pregnancy:  
 clinical assessment +/- NT-proBNP +/- echocardiogram



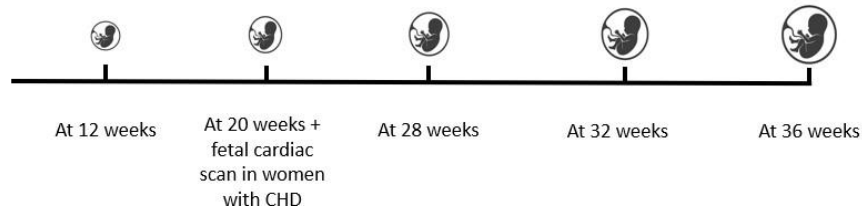
**Fetal Surveillance**

- In women with congenital structural heart disease, the risk of fetal congenital heart disease is higher (1-2% in the general population; 3-4% if parents have CHD). A detailed fetal echocardiogram should be requested at 20 weeks gestation.

**Fetal growth scans**

- Most women with cardiac disease do not require additional fetal monitoring throughout pregnancy. In some circumstances, the introduction of high doses of cardiac medications or significant maternal pathology, will prompt the team to request serial growth scans in the second and third trimester. Women with severe cardiac disease are at risk of early onset IUGR, so serial growth scans should be arranged from 26 weeks.

Fetal scans in women with mWHO III-IV cardiac disease and uncomplicated pregnancies:



**INTRAPARTUM PLAN**

Patient:		EDD:	
Address:		Obstetrician:	
Telephone no:		Cardiologist:	
Date of Birth:		Obstetric Anaesthetist:	
Hospital no:		Midwife:	
NHS no:		Parity:	
Site for Delivery:		Planned Mode of Delivery:	

**Cardiac Diagnosis**

**Main haemodynamic risks during Peripartum Period (e.g. hypertension/tachycardia)**

**Additional Obstetric/Medical Issues**

**Current Medications**

Anaesthetic Decisions	
WHEN ADMITTED: Please inform the Obstetric and Anaesthetic teams who will escalate to the senior, maternal medicine and cardiology as required.	
<b>Monitoring:</b>	
Standard Only	
Arterial Line	
CVP Line	
Continuous cardiac monitoring	
<b>Anaesthetic Technique:</b>	
Suitable for single-shot spinal/rapid epidural top-up	
Slow regional technique/CSE only	
GA only	
Anaesthetic Comments:	

Intrapartum Management	
Tocolysis (if required)	
Antibiotic Prophylaxis	
Penicillin Allergy	
Suggested alternative if Penicillin allergic	
Epidural Analgesia	
Fluid Management	
Fluid Restriction	
Limit pushing in 2 <sup>nd</sup> stage to	

Management of the third stage of labour for women with mWHO III or mWHO IV heart disease			
Condition	First-line uterotonic	Second-line uterotonics	Drugs to avoid
<b>Significant aortopathy</b>  Marfan syndrome and Loey's–Dietz with aortic dilatation >40 mm  Bicuspid aortopathy and aortic dilatation >45 mm  Previous aortic dissection  Turner syndrome and aortic size index >25 cm/m <sup>2</sup>	Oxytocin (slow bolus)	Misoprostol  Carboprost	Ergometrine (because of risk of hypertension-induced aortic dissection or rupture)

MATERNAL MEDICINE NETWORK

<p><b>Limited or fixed low cardiac output, or preload-dependent circulation</b></p> <p>Severe systemic ventricular dysfunction (ejection fraction &lt;30%)</p> <p>Severe valvular stenosis</p> <p>Hypertrophic cardiomyopathy with diastolic dysfunction or significant outflow tract obstruction</p> <p>Fontan circulation</p> <p>Cyanotic heart disease</p>	<p><b>Slow infusion</b> of oxytocin to avoid sudden haemodynamic change</p>	<p>Misoprostol</p> <p>Carboprost</p>	<p>Long-acting oxytocin analogues and ergometrine (because of risk of hypertension-induced heart failure)</p>
<p><b>Pulmonary arterial hypertension</b></p>	<p>Oxytocin</p>	<p>Misoprostol</p>	<p>Ergometrine, carboprost and long-acting oxytocin analogues (because of risk of worsening pulmonary hypertension)</p>
<p><b>Coronary artery disease</b></p>	<p>Oxytocin</p>	<p>Misoprostol</p>	<p>Ergometrine (because of risk of coronary ischaemia)</p>

Management of the Third Stage	
Oxytocin Use	
Misoprostol	
Ergometrine	
Hemabate (Carboprost)	
<b>OTHER DRUGS</b>	
Nifedipine	
Prostin	
Others	

Postnatal Management	
Thromboprophylaxis	
Comment:	
Postnatal Monitoring Required	
Comment:	
Other Postnatal Instructions	
Cardiology Review	
OPD in weeks	
Please book with following team/secretary:	
Contraception Advice	
Recommended Method	



Signature:		Date:	
Name:			
Designation:			

#### 4.0 Contact Details

<b>Within the hospital – each hospital will have individual arrangements</b>
Medical team and Cardiology via A&E Maternal medicine consultant & midwives
<b>Within network for specialist or multidisciplinary input</b>
<b>Maternal medicine clinician to refer patient using <a href="#">Refer-a-Patient</a> platform</b>

#### 5.0 References and Abbreviations

<b>References</b>	
2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy: The Task Force for the Management of Cardiovascular Diseases during Pregnancy of the European Society of Cardiology (ESC) <a href="https://doi.org/10.1093/eurheartj/ehy340">https://doi.org/10.1093/eurheartj/ehy340</a>	
<b>Abbreviations</b>	
CHD	Congenital Heart Disease
CSE	Combined Spinal-Epidural
CVP	Central Venous Pressure
EDD	Estimated Date of Delivery
GA	General Anaesthesia
HTAD	Heritable Thoracic Aortic Disease
MMC	Maternal Medicine Centre
mWHO	modified World Health Organisation
NT-proBNP	N-terminal pro b-type natriuretic peptide
OPD	Outpatient Department