MEDICAL DISORDERS ASSOCIATED WITH PREGNANCY

CARDIAC DISEASE AND PREGNANCY

Keywords: Cardiac disease, heart disease, cardiac failure, birth planning, peripartum cardiomyopathy, acute heart failure, antibiotic prophylaxis, thromboprophylaxis

CARDIAC DISEASE AND PREGNANCY QRG

ANTEPARTUM
1. **Preconception** counselling, education & assessment & refer early pregnancy care to tertiary centre
2. **Baseline evaluation** early pregnancy (risks, physical examination, electrocardiogram (ECG) & other tests as per Obstetric Physician), with careful check-up of women from developing countries.
3. **Ultrasound** (1st trimester screen; tertiary fetal anatomy scanning at 18-22 weeks & 2nd trimester fetal echocardiography if maternal structural cardiac disease).
4. **Regular antenatal care**
   - Visits every 2-3 weeks >20wks, fortnightly >28wks, weekly >36wks
   - Check blood pressure (BP) manually; check for signs/ symptoms of cardiac failure (auscultate lungs, pulse rate/rhythm, jugular venous pressure) & monitor for atypical signs of ischaemia.
   - Screen for asymptomatic bacteriuria at first appointment (if not already done) & prevent anaemia
5. **Birth planning** (Multidisciplinary team approach)
   - Document planned intrapartum care (analgesia, labour supervision, birth mode, second stage management, oxytocin, PPH prevention, thromboprophylaxis & antibiotic prophylaxis (where indicated) & length of postpartum stay) in medical record on MR 004.
6. **Encourage rest & admit if chest infection or cardiac failure occurs.**
7. **Ask** Obstetric Physician about endocarditis prophylaxis & antibiotics for dental/surgical procedures.

INTRAPARTUM
2. Additional observations/care (Cardiac exam 4 hourly, strict fluid balance chart, oxygen if required, haemodynamic monitoring & pulse oximetry if indicated; respirations, pulse & BP half hourly)
   - If major cardiac risk: Position in sitting or semi-Fowlers.
3. **Continuous fetal heart rate monitoring.**
4. **Consider:** Analgesia (e.g. epidural) & monitoring intravenous fluids; Antibiotic prophylaxis & Shortened second stage when major cardiac risk present.
5. **Prevent PPH:** Use oxytocin infusion 60units in 500ml Hartmann’s solution- rate to be documented by Obstetric Physician. Do not use ergometrine routinely.

POSTPARTUM
1. **Manage** high risk cases in Adult Special Care Unit (ASCU) until maximum risk period passed.
2. **Thromboprophylaxis:** Anti-embolic stockings & early ambulation; delay warfarin (where applies).
3. **Breastfeeding:** Encourage, where not medically contraindicated. Encourage rest & educate on signs/ symptoms of mastitis/ infection & action to take if develops.
4. **Discuss** contraception, future pregnancy guidance & regular cardiac reviews.
5. **Follow up** at 6 weeks (& 6 months if continued concerns), then return to usual cardiac care.

Note: This flowchart represents minimum care & should be read in conjunction with the following full guideline & disclaimer. Additional care should be individualised as needed.
AIM

- To provide information on the management of cardiac disease in pregnancy for the antenatal, intrapartum and postnatal periods.

BACKGROUND

Cardiovascular disease (CVD) affects approximately 0.2% to 4% of pregnant women. Maternal mortality in pregnant women with CVD is about 1%, which is 100 times higher than women without CVD. In western countries CVD is increasing and is a major cause of maternal mortality in pregnancy. Congenital heart disease (CHD) is the predominant type of CVD in first world countries, whilst rheumatic cardiac disease is still an important cause of morbidity and mortality in developing countries, groups living in poor socio economic conditions, and Indigenous Australians. Furthermore, ischaemic heart disease in pregnancy is becoming more prominent with a higher number of older women giving birth, obesity, smoking, hypertension, hypercholesterolaemia and the incidence of diabetes increasing.

Mortality of women with cardiac disease is low except in certain conditions such as Eisenmenger’s syndrome, pulmonary hypertension, severe systemic ventricular dysfunction, and Marfan’s syndrome with pathology of the aorta, where pregnancy may be contraindicated. Careful monitoring through pregnancy is required as there are altered physiological demands on the woman’s body, including cardiovascular system, glucose, cholesterol and coagulation homeostasis.

CLASSIFICATION OF CARDIAC DISEASE

Cardiac disease is classified according to functional status:

1. Class I asymptomatic with normal activity.
2. Class II symptoms with normal activity.
3. Class III symptoms with less than normal activity.
4. Class IV symptoms with any physical activity or at rest.

KEY POINTS

1. An electrocardiogram (ECG) is required by all women who have chest pain in pregnancy. Additionally, if the pain is severe, a computed tomography (CT) or magnetic resonance imaging (MRI) scan of the chest and serum troponin levels may be ordered, as decided by the Obstetric Medical team.
2. If the woman has congenital heart disease the risk of fetal congenital heart disease varies between 6 to 50%.
3. Pregnant women with cardiac disease are at risk of serious morbidity such as heart failure, arrhythmias and stroke.

ACUTE CARDIAC FAILURE

If acute cardiac failure develops:

- Sit the woman up and lower her legs
- Administer oxygen
- Intravenous frusemide 40mg (diuretics) and/or intravenous morphine 5mg to 10mg administered slowly
- Consult the physician.

Except in an emergency, digoxin is to be commenced by the obstetric physician and is rarely utilised. Postpartum: Angiotensin Converting Enzyme (ACE) Inhibitors including enalapril and ramipril may be used, and are safe to use in breastfeeding mothers.
ANTENATAL

1. **Pre-conception counselling**, education and assessment. Ideally women with known cardiac disease will have been assessed in the preconception period. Significant pulmonary hypertension in pregnancy is a high risk situation. Preconception counselling should be undertaken with multidisciplinary specialists as to the risks posed by the pregnancy, including risk of maternal death. In the event of an unplanned pregnancy, early consultation is essential for assessment of maternal risk if the pregnancy continues and discussion of all options.

2. **Referral** of high risk women to a tertiary maternity service (dependent on CVD complexity, risks and services available) and early pregnancy management.

   Referral sent to Obstetric Physician for women with:
   - A past history of cardiac disease
   - Symptoms or signs of cardiac disease

3. **Baseline evaluation** early pregnancy with physical examination.
   - An ECG shall be done on referral; other investigations should be left to the obstetric physician.
   - Risk stratification assists in determining appropriate level and timing of antenatal care.
   - Careful screening with a physical examination should be performed on women who come from developing countries as the incidence of rheumatic heart disease is high in these areas.

4. **Ultrasound**:
   - First trimester ultrasounds, particularly around 13 weeks, have been shown to detect major congenital heart disease with 85% sensitivity and 99% specificity, thus providing earlier detection, consideration of options and management. In the case of congenital heart disease of the mother, increased nuchal thickness of the fetus at the 12 week gestation scan is associated with fetal congenital cardiac disease (some studies suggest it may have a sensitivity of up to 90% for cardiac lesions).
   - Fetal echocardiography by a fully trained fetal cardiologist should be offered in the second trimester to women with structural cardiac disease.
   - Careful tertiary fetal anatomy scanning at 18-22 weeks should be performed looking for cardiac abnormality.

5. **Antenatal care**:
   - Prevent anaemia.
   - A woman with significant cardiac disease will require more frequent antenatal assessments. The suggested frequency is every 2-3 weeks after 20 weeks, fortnightly after 28 weeks gestation and weekly after 36 weeks gestation.
   - At each assessment check blood pressure manually and check for signs and symptoms of cardiac failure (e.g. auscultate lungs, check jugular venous pressure, pulse rate and rhythm).
   - Monitor for any atypical signs of ischaemia such as shortness of breath, dizziness or vomiting, with a low threshold for cardiac investigations (e.g. ECG, troponin levels, stress testing).
   - Screen women with CHD for asymptomatic bacteriuria at the first antenatal appointment if not done previously in the pregnancy, due to the risk of pyelonephritis.

6. **Planning for birth** should be undertaken by the Obstetric Medical team in consultation with the woman and other members of the multidisciplinary team which may include cardiologists, maternal fetal medicine specialists, anaesthetists and midwives.
   - The obstetric management plan is to be discussed with the woman and documented in the medical record on the MR 004: Obstetric Special Instruction Sheet. This should occur early in pregnancy and again at 32-34 weeks. Plans include analgesia, who should supervise the labour, planned birth mode, second stage management, postpartum haemorrhage (PPH) prevention, oxytocic, thromboprophylaxis, and length of postpartum stay.
   - Vaginal birth usually carries the lowest risk of complications, although ideally long and difficult labours should be avoided.
   - Induction of labour may be appropriate for optimising anticoagulation, specialist medical staff presence, or deteriorating maternal cardiac function as decided by the Obstetric Medical team. Induction may increase the chance of caesarean birth.
   - Document specific instructions for intrapartum antibiotic prophylaxis (where applicable).
7. **Encourage rest** in the third trimester (symptomatic women may need to finish work earlier) and admit to hospital if there is a major risk of cardiac failure. Admit if chest infection or cardiac failure occurs. Women with significant cardiac disease require thromboprophylaxis when admitted to hospital for bedrest in pregnancy, and may require it in the postpartum period.

For **venous thromboembolism (VTE)** information and **prophylaxis** see also Clinical Guideline, O&M, Complications of Pregnancy:

- VTE: Cardiac Conditions: Women with
- Venous Thrombosis Occurring in the Present Pregnancy

8. **Consult** the Obstetric Physician or Clinical Microbiologist on infective endocarditis (IE) prophylaxis. Generally, antibiotic prophylaxis will be recommended for women with high risk cardiac disease as per the Australian Therapeutic Guidelines, see tables 1 and 2 below.

**Rationale:** IE is a rare, but serious, condition in pregnancy. It has not been established if labour is a risk factor for IE and UK (NICE)\(^1\) and European (ESC)\(^1\) guidelines summarise the evidence and state antibiotic prophylaxis for IE should not be given during any gynaecological or obstetric procedure, including childbirth. The Australian Therapeutic guidelines (TGA)\(^13\) recommend targeting patients with high risk cardiac disease (table 1) who have prolonged labour i.e. at high risk of prolonged and intense bacteraemia with bacteria known to cause IE. As prolonged labour may not be predicted at the onset, IE prophylaxis may be used for all women in labour with high risk cardiac lesions as described in table 1.

**INTRAPARTUM**

Labour is potentially the most dangerous period for many women as this is the period with the greatest increase in cardiac output.\(^4,14,15\)

Consider two groups:

- **Major Risk** - those women with increased risk of cardiac failure - such as women with Grade III and IV cardiac disease, mitral stenosis and atrial fibrillation.
- **Minor Risk** - those women with relatively minimal disease - such as women with Barlow’s Syndrome or a small atrial septal defect.

**MANAGEMENT IN LABOUR**

1. **Notify:**

   - In all cases - Obstetric Registrar.
   - In all major risk cases - Senior Obstetric Registrar, Obstetric Consultant, Obstetric Physician, Anaesthetic Registrar, Labour and Birth Suite Consultant Anaesthetist (the Obstetric Physician will indicate if he/she is to be notified).

2. In addition to routine labour observations:

   - Respirations half-hourly. Women with a major cardiac risk must have half-hourly observations (pulse, respirations and blood pressure) and be nursed in a sitting or semi Fowler’s position.
   - Relevant cardiac examination at least 4 hourly.
   - Strict fluid balance chart.
   - Oxygen, invasive haemodynamic monitoring and pulse oximetry if indicated.\(^4,15\)

3. **Antibiotic cover:** (see tables 1 and 2 on next page)

   Start when labour commences or at induction (including cervical ripening). Use in all women with cardiac conditions described in table 1.

**Note:** Routine labour antibiotic prophylaxis is not indicated for women with cardiac disease of low risk.\(^16\) Additionally, continuation of antibiotic prophylaxis *postnatally* is not routinely recommended.
Table 1. From Therapeutic Guidelines Australia¹³: High risk cardiac disease for IE antibiotic prophylaxis at labour.

<table>
<thead>
<tr>
<th>High risk cardiac disease:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prosthetic valve (any type)</td>
</tr>
<tr>
<td>Prosthetic material used for cardiac valve repair</td>
</tr>
<tr>
<td>Previous infective endocarditis</td>
</tr>
<tr>
<td>Rheumatic heart disease</td>
</tr>
<tr>
<td>Congenital heart disease but only if:</td>
</tr>
<tr>
<td>- unrepaired cyanotic defects, including palliative shunts and conduits</td>
</tr>
<tr>
<td>- completely repaired defects with prosthetic material or devices, whether placed by</td>
</tr>
<tr>
<td>surgery or catheter intervention, during the first 6 months after the procedure (after</td>
</tr>
<tr>
<td>which the prosthetic material is likely to have been endothelialised)</td>
</tr>
<tr>
<td>- repaired defects with residual defects at or adjacent to the site of a prosthetic patch</td>
</tr>
<tr>
<td>or device (which inhibit endothelialisation)</td>
</tr>
<tr>
<td>Cardiac transplantation with the subsequent development of cardiac valvulopathy</td>
</tr>
</tbody>
</table>

Table 2. Prophylactic antibiotics (Note: if established infection see below, therapeutic antibiotics)

For women NOT allergic to beta-lactam antibiotics (e.g. penicillin or cephalosporin antibiotics):

<table>
<thead>
<tr>
<th>Amoxycillin</th>
<th>Initial: 2 grams intravenously (IV).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Thereafter: 1 gram IV 8 hourly until</td>
</tr>
<tr>
<td></td>
<td>delivers.</td>
</tr>
</tbody>
</table>

For women allergic to beta-lactams (e.g. penicillin or cephalosporin antibiotics):

| Vancomycin  | Initial: 25mg/kg up to 1.5 grams IV  |
|-------------| over 2 hours.                        |
|             | Thereafter: repeat same dose 12hourly|
|             | until delivers.¹³                    |

Women having an Elective/Non-elective Caesarean Birth

Initial: Antibiotic prophylaxis at the time of caesarean in accordance with Clinical Guidelines, Section P 4.2 Antibiotic prophylaxis for Caesarean section (see link).
i.e. no supplementary IE prophylaxis required for Caesarean section.

Note: Dose adjustment may be required in patients with renal impairment, please contact a pharmacist or on call microbiologist for advice.

Therapeutic antibiotics

- Treat any suspected infection aggressively with parenteral antibiotics after blood and other appropriate cultures are taken.
• Contact the on-call Clinical Microbiologist for specific advice.

4. **Epidural** analgesia may be used for obstetric indications. For high-risk women managing their pain well will decrease their cardiac workload during labour.\(^1\)\(^,\)\(^8\) The Anaesthetic Registrar must first discuss major risk cases with the Anaesthetic Consultant.\(^4\)

5. Continuous electronic **fetal heart rate monitoring**.\(^1\) See also Clinical Guideline Section B: 5.6 *Intrapartum fetal heart rate monitoring*.

6. Vaginal birth is preferred unless obstetric or specific cardiac condition requires caesarean birth.\(^6\)

7. Shorten the **second stage** if there is major risk of cardiac failure or hypertension.
   - Intervention carries a risk of infection.
   - Avoid routine mid cavity forceps birth.
   - Assisting vaginal birth and limiting active maternal pushing may be necessary dependent on the woman’s clinical situation to reduce additional load on the cardiovascular system.\(^8\)
   - Pushing in the left lateral position, rather than supine, lessens cardiovascular changes.\(^1\)

8. **Prevent PPH** (particularly if surgical intervention) which may lead to cardiovascular instability.\(^8\)
   - Do not use ergometrine routinely (can cause acute hypertension).\(^8\)
   - Use **oxytocin** by intravenous infusion in preference to oxytocin 10 units intramuscular or intravenous bolus (as bolus doses may cause hypotension).\(^1\)\(^,\)\(^8\)
   - A suggested regime is **oxytocin 60 units in 500ml Hartmann’s solution** by intravenous infusion (rate to be documented by attending Obstetric Physician). Rapid infusion of oxytocin may cause hypotension so, if given intravenously as a bolus, should be given slowly.\(^4\)
   - In caesarean, uterine compression sutures may be beneficial to control PPH from uterine atony.\(^8\)

**POSTPARTUM**

1. Manage high-risk cases in Adult Special Care Unit (ASCU) **postpartum**. Haemodynamics do not return to normal for several days. Monitoring in ASCU should be continued until the maximum risk period has passed.\(^8\) This will depend on the nature of the cardiac disease.\(^4\)

2. For **VTE prevention**: Encourage anti-embolic stockings and early ambulation after birth.\(^1\)
   - Resumption of warfarin anticoagulation (where applicable) should be delayed by 2 days postpartum due to the increased risk of PPH, and close monitoring is required.\(^8\) See also Clinical Guideline, Section B: 2.12.4 *Women with cardiac conditions*.

3. The woman’s choice to breastfeed should be promoted, where not medically contraindicated.\(^17\)
   - Educate the woman on breast care, adequate rest, the signs/symptoms of mastitis and what to do if she develops these. The risk of bacteraemia from mastitis is low, but early antibiotic treatment should be commenced in high risk patients. Bottle feeding may be medically indicated in women with high risk cardiac condition and severe mastitis.\(^1\)

4. Discuss safe and effective contraception options, future pregnancy guidance and importance of women with significant heart disease having regular cardiac reviews prior to any future pregnancy.\(^8\)

5. **Postnatal multidisciplinary follow up assessment at 6 weeks** (and at 6 months if there are continued concerns), with the woman then returning to her routine cardiac outpatient care.\(^8\)

**PERIPARTUM CARDIOMYOPATHY**

Peripartum cardiomyopathy is a cardiac condition that develops in the absence of pre-existing heart disease or identifiable cause.\(^18\) It can cause serious complications and maternal mortality,\(^1\) and should be considered in women who present with shortness of breath/dyspnoea/orthopnoea (particularly when supine or at night) usually in the third trimester or up to 6 months after birth.\(^6\)\(^,\)\(^18\)

Other symptoms include tachypnoea, tachycardia\(^5\), palpitations, peripheral oedema (pitting), excessive third trimester weight gain, chest pain, cough, and frequent night urination.\(^18\)

Risks include multiparity, ethnicity, smoking, diabetes, hypertension or pre-eclampsia, and advanced or teen maternal age.\(^3\)\(^,\)\(^6\)\(^,\)\(^7\) A chest x-ray, echocardiogram and ECG should be considered by the obstetric medical team.\(^3\)\(^,\)\(^6\)
REFERENCES (STANDARDS)


National Standards – 1 Clinical Care is Guided by Current Best Practice
3 Preventing and Controlling Healthcare Associated Infection
Legislation - Nil
Related Guidelines / Policies – Section B Guidelines Relevant to Obstetrics and Midwifery
Other related documents – Nil

RESPONSIBILITY
Policy Sponsor Medical Director Obstetrics
Initial Endorsement August 2001
Last Reviewed August 2014
Last Amended December 2014
Review date December 2017