Cardiac disease (congenital / acquired) in pregnancy guideline, version 4.0

Description	Women and Newborn/ cardiology clinical guideline		
Target audience	All staff involved in providing care for women with cardiac disease in pregnancy		
Related documents / policies (do not include those listed as appendices)	• Antenatal Booking Process Referral Guideline • Care in labour guidance • Diathermy Policy for Patients with Cardiac Implantable Electronic Devices (CIEDs) • High Dependency Unit: Guideline • Timings and Indications for Obstetric Referral at Booking and During Guideline • Which Obstetrician - Referral Guide for Core Team Midwives: Guideline • Wessex Maternal Medicine Network Guidance		
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Policy sponsor	Freya Pearson – Divisional Clinical Director		
Is there any non-compliance with NICE guidance?	No		
First Consultation	**April 2024:** W&N Anaesthetic Guideline Consultation Group W&N Gynaecology Guideline Consultation Group W&N Midwifery Guideline Consultation Group W&N Neonatal Guideline Consultation Group W&N Obstetric Guideline Consultation Group		
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Approval committee		Approval date	
Women and Newborn Governance Steering Group		07/06/2024	
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	4.0	June 2024	07/06/2027

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1. Version control

Date	Consultation / Comments	Version created	Page	Key changes
04/09/2020	Matthew Coleman, Marie Cann, Lisa Smith, Hannah Leonard	3.0		Summarise most recent changes. Include whether this replaces or revises an existing document.
2024	Sarah Walker, Christina Nurmahi, Tara Selman Natalie Brown	4.0		Update and addition of CIED links and information and referral email. Regional consultation and agreement at the cardiac network meeting

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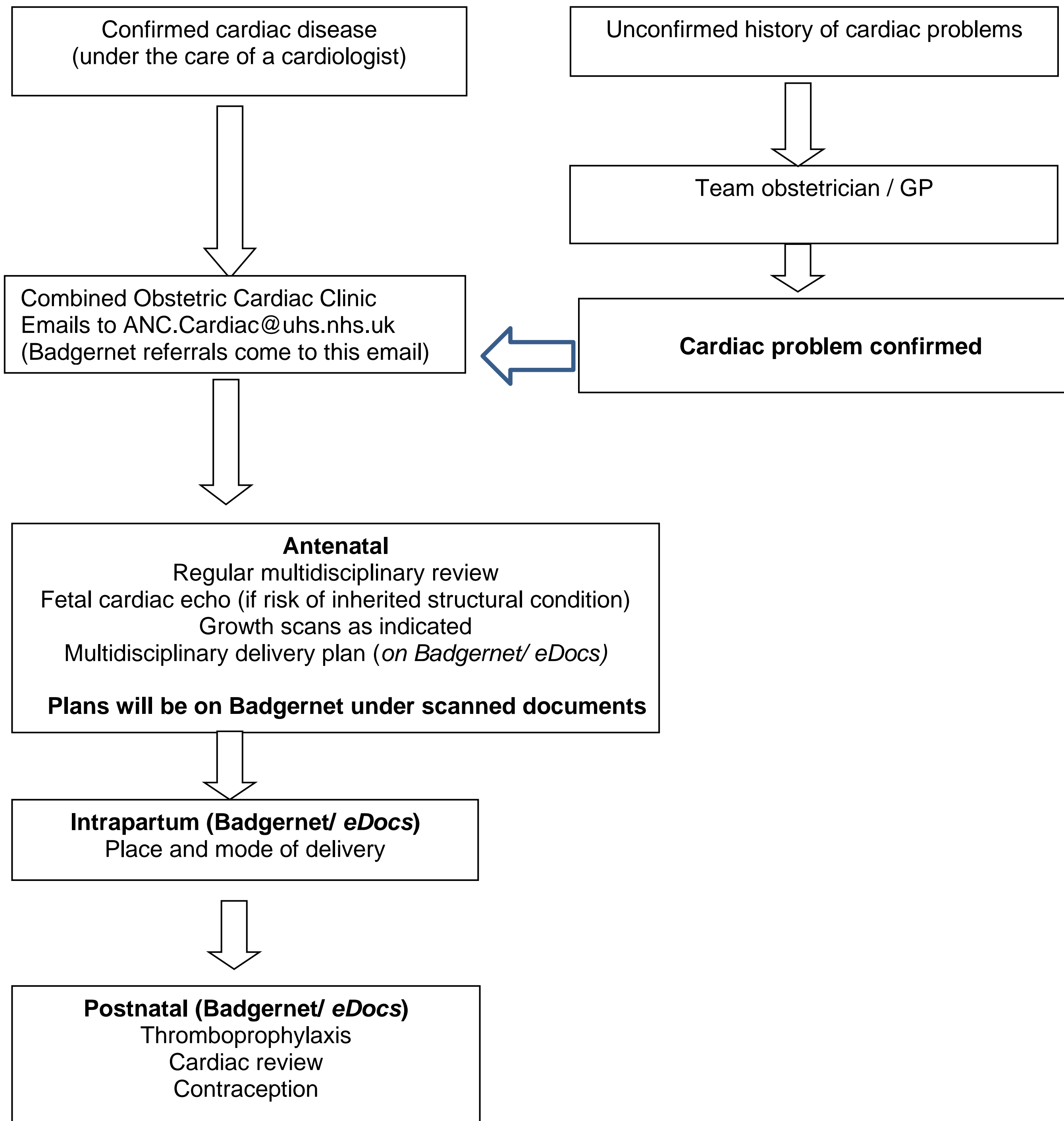
3. Executive Summary / Introduction

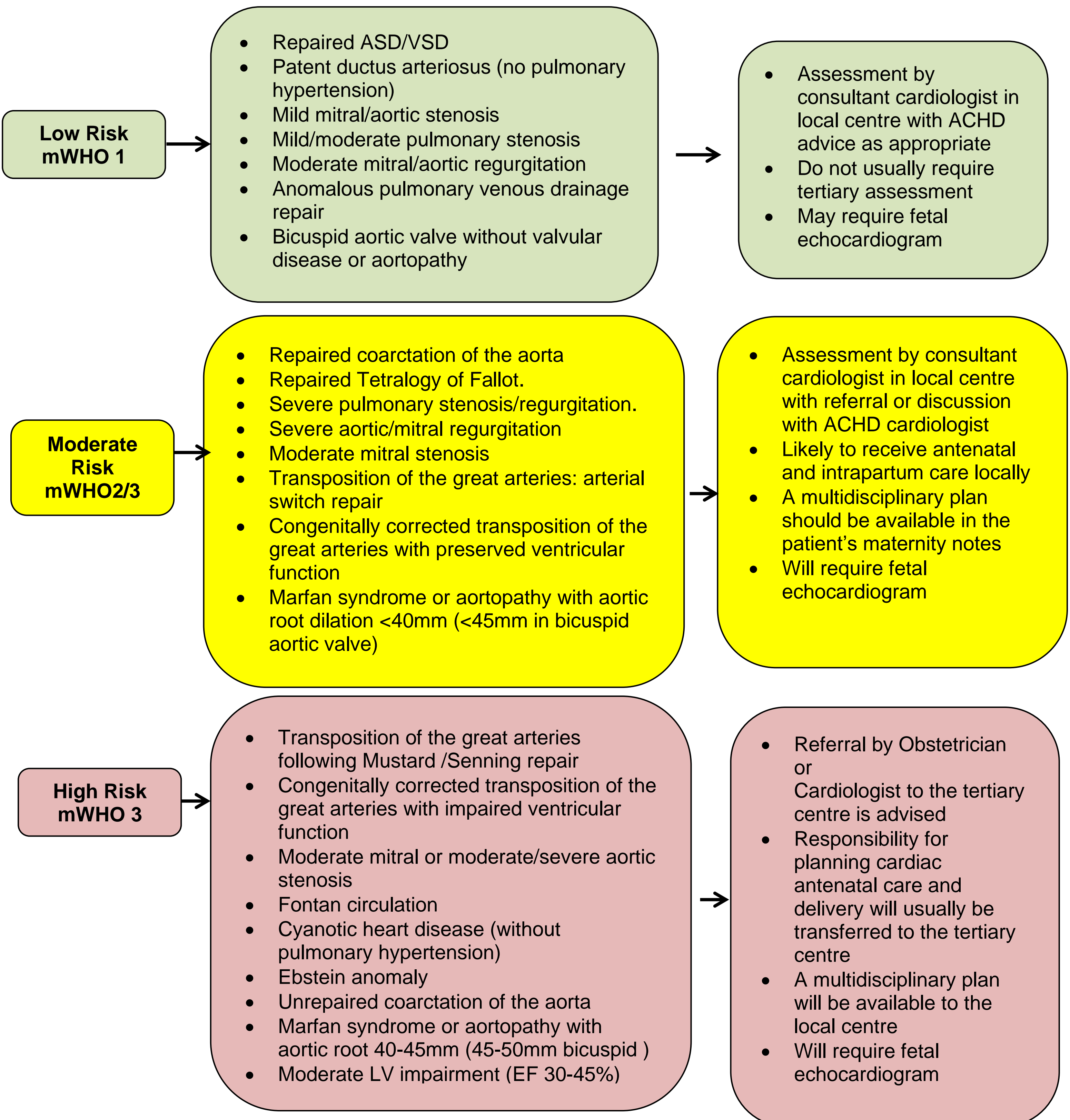
Referral Pathway for local Women
(In italics if applicable in Southampton only)



Regional Referral Pathway for Pregnant Women with Known Cardiac Disease

All women with known cardiac disease should have received pre-conception counselling by a consultant cardiologist or an Adult Congenital Heart Disease (ACHD) consultant in the case of congenital heart disease. (see appendix one for further information)

CONGENITAL HEART DISEASE



Very High Risk mWHO 4

- Pulmonary arterial hypertension (including Eisenmenger syndrome).
- Marfan syndrome or other aortopathy/CTD (incl Turners with ASI>25mm/M2) with aortic dilatation >45mm, Bicuspid aortic valve >50mm
- Severe mitral stenosis/symptomatic aortic stenosis
- Severe LV impairment (EF < 30%)

→

- Full cardiac, antenatal care and delivery at the tertiary centre recommended
- Will require fetal echocardiogram

Acquired Valvular Heart Disease

Acquired mitral and aortic disease including rheumatic heart disease and bio-prosthetic heart valves

→

- Initial assessment by cardiologist at the local centre
- Place of further antenatal care and delivery dependent upon severity
- Discussion with the tertiary centre may be appropriate. Refer all with moderate aortic or mitral stenosis for assessment

Mechanical heart valves

→

- Pre-conception counselling highly recommended including detailed anti-coagulation strategy
- Assessment, preferably within 6 weeks of conception, by the local or tertiary centre
- Detailed anticoagulation management plan essential
- Discussion with the tertiary centre for further antenatal care and delivery

Cardiomyopathies

Previous peripartum cardiomyopathy

Dilated / hypertrophic cardiomyopathy

→

- Initial assessment will usually take place at the local centre. Discussion with the tertiary centre may be appropriate
- Place of further antenatal care and delivery will be dependent upon the severity for management

Ischaemic Heart Disease

Acute coronary syndromes →

- Use ACS protocols for non-pregnant women (See ESC guidelines)
- Discussion with the tertiary centre recommended
- Plan of care to be made jointly with local Obstetricians, Anaesthetists and Cardiologists.

Stable ischaemic heart disease →

- Discussion with the tertiary centre may be appropriate

Arrhythmias/Pacemakers

- Initial cardiology assessment at the local centre.
- Discussion with the tertiary centre may be appropriate.
- Plan of care to be made jointly with local Obstetricians, Anaesthetists and Cardiologists.
- Potential to deliver at local centre dependent on perceived risk and facilities available.

4. Scope and purpose

Cardiac disease remains a leading cause of indirect maternal death in the UK (1.62 per 100,00 maternities 2022). The numbers of pregnant women with cardiac disease will continue to increase as a result of improved care of congenital cardiac disease, increasing incidence of ischaemic heart disease and increased detection of cardiomyopathies.

Pre-existing cardiac disease increases the risk of pregnancy to both mothers and their babies. Affected women should be referred to the combined clinic for multidisciplinary care.

Mothers are at risk of adverse cardiovascular events including dysrhythmia, stroke, heart failure, pulmonary oedema and death and the risk is determined by the ability of their cardiovascular system to adapt to the physiological changes of pregnancy. This will depend on the nature of the cardiac abnormality, result of cardiac surgery and current cardiac function.

Other risks to the pregnancy may include:
A higher incidence of congenital heart disease in those born to affected parents (maternal or paternal). An increased risk of fetal growth restriction, prematurity and fetal loss in women with poor cardiac function, cyanosis or restricted left ventricular outflow by reducing flow to the placenta.
The baby may also be affected by maternal drugs e.g. anti-hypertensives, anticoagulants, heart failure medications or drugs for rhythm control.

5. Definitions

ACHD – Adult congenital heart disease
CIED's- Cardiac Implantable Electronic Devices
MEC- Medical Eligibility Criteria
NT- Nuchal translucency
LMWH – Low molecular weight heparin
TIA – Transient ischaemic attack
FMU – Fetal Medicine unit
LV- Left ventricle
CTD- Connective tissue disorder

6. Details of policy/procedure to be followed

6.1 Principles of care

Women with significant congenital or acquired heart disease should:

1. Be referred for pre-pregnancy assessment and advice at the earliest opportunity
2. Receive shared care during pregnancy involving cardiologists with experience of pregnancy, and obstetricians and obstetric anaesthetists with experience of cardiac disease.
3. Have a clear plan of care for their delivery and immediate post-partum period documented on the electronic computer system (e-docs at UHS or equivalent in local hospital) under the obstetric section. This plan is also added to the digital maternity system (Badgernet) under scanned documents.

6.2 Preconception counselling

Women should be given information on:

- The risk to mother and baby, including fetal and maternal mortality and morbidity.
- The risk of congenital or inherited heart disease in the baby (with consideration of preimplantation genetic diagnosis via local genetics team if condition meets criteria- NHSE 2014)
- Maternal (or paternal if the father is affected) life-expectancy
- The level of care anticipated during pregnancy
- Contraception

Women may need optimisation of their cardiac condition.

In some cases this may include surgery to improve function before embarking on pregnancy or adjustment of drug therapy, including stopping potentially teratogenic drugs such as anti-hypertensives and oral anticoagulants. If this is the case clear advice on contraceptive use should be provided.

6.3 Antenatal Care

6.3.1 Women with a history of congenital or acquired cardiac disease need early booking within the first trimester and referral to obstetric care as outlined in the executive summary.

6.3.2 Women with confirmed cardiac disease, already under the care of a cardiologist should be referred to the joint cardiac/obstetric clinic or local lead obstetrician/cardiologist (in Southampton either to Dr Carroll / Dr Fitzsimmons or Dr R Parasuraman/ Dr Stocker). The Southampton clinic is held on Wednesday afternoon twice a month.

6.3.3 Women with an unconfirmed history of cardiac problems (e.g. palpitations or a murmur which has not required previous investigation) should be referred to the GP and team obstetrician, who should assess and consider onward referral for a local cardiac assessment. If significant cardiac problems are identified, the women should then be referred to the combined clinic. Referral to a cardiologist should be made for:

- Definite history of cardiac problems that do not appear to have been fully investigated by a cardiologist.
- Women presenting with a significant change in symptoms who have previously been investigated for cardiac problems, even if discharged from follow-up.
- History and clinical examination suggestive of new onset cardiac disease.

6.3.4 Mothers with significant cardiac disease need care planned on an individual basis. Depending on the severity of disease, this will often involve multidisciplinary discussion including cardiology, anaesthetics (both obstetric and cardiac) and obstetrics.

6.3.5 The diagnosis, antenatal, delivery and postnatal management plans need to be clearly documented on the e-docs form and uploaded to the woman's local digital system and Badgernet. If they are cared for in a hospital without Badgernet the plan will be sent to their local clinical team for uploading to their system.

6.4 Anticoagulation

Women requiring anticoagulants may need increased monitoring and a balance between the risk of warfarin to the fetus and the safety of low molecular weight heparin with their particular cardiac abnormality. Where warfarin is changed over to subcutaneous low molecular weight heparin (e.g. enoxaparin 1mg/kg *twice* daily), *weekly* anti-Xa levels are required. The anti-Xa level should be maintained with trough level >0.6 and peak level between 0.8 and 1.2 U/mL depending on the indication and type of prosthetic valve (0.8-1.2 for aortic, 1.0-1.2 for mitral and pulmonary prosthetic valves) determined 4h after administration; the blood sample should be sent to the lab within 30minutes of taking. [3]

For a given dose of enoxaparin, anti-Xa trough levels are affected by volume of distribution, whereas peak anti-Xa levels are mainly determined by creatinine clearance.

If an anticoagulation plan is required there should be liaison with the regional Haematology MDT for planning of blood testing.

Fetal Ultrasound

Routine ultrasound scans for these patients would include

- 11- 13 weeks: First trimester dating /NT scan
- 20 weeks: Anomaly scan including fetal echocardiography
- Growth scans if indicated

6.5 Timing and place of delivery

This should be considered as early as possible and may need to be modified in later pregnancy depending on the mother's progress.

For women referred to the regional centre, a back-up plan for care in the event of delivery in a peripheral unit should be drafted for women referred from elsewhere and copies added to the local digital system and maternity digital system and sent to the referring clinician to be added to their local digital system. This summary should outline the potential complications and give clear guidance to support the woman and local physicians.

6.6 Management in Labour

Care should be individually determined depending on the specific cardiac disease, severity and the mother's condition and the plan for delivery should be recorded on the e-docs proforma and uploaded to the local digital system and badgernet. The following general guidelines should be observed:

- Early involvement of senior obstetric and anaesthetic staff. Inform the cardiology team as recommended by delivery plan. If new presentation or cardiac concerns, consult the cardiology team on call (general adult cardiology or adult congenital cardiology teams as appropriate). Aim to maintain hemodynamic stability
- Invasive hemodynamic monitoring as specified in the delivery plan
- Aim to reduce pain and its haemodynamic responses
- Epidural analgesia with narcotic/low-dose local technique generally recommended
- Proactive management of the third stage with oxytocin according to the delivery plan and usually avoiding ergometrine.

- The period of highest risk is the early puerperium when there may be large changes in maternal blood volume as a result of autotransfusion as the uterus contracts, or from post-partum haemorrhage. Careful fluid balance should be recorded and maintained throughout labour and birth.

6.7.1 Cardiac Implantable Electronic Devices (CIED's)

The cardiac plan will include if the woman has an implantable cardiac device (ICD) in situ.

- ECG monitoring if concerns.
- ICD in situ- If emergency section, switch off defib function (sensing) after placing external defib pads via contacting bleep 9073 pacing technician on call in hours or use magnet out-of-hours.
- The magnet is stored in the Anaesthetic Room of theatre B in PAH theatres (on the outside of the controlled drugs cupboard).
- MAGNET must be placed over the ICD. This will switch off defibrillator function and allow pacing function to continue. Remove magnet when diathermy finished and defibrillator function will return. If goes into shockable rhythm with magnet in place, remove magnet and give external cardioversion if internal shock not given.
- Preference to use bipolar diathermy. If monopolar necessary, use short bursts and place plate on lower right thigh.
- For further information please see Trust guidance on CIED's - Diathermy Policy for Patients with Cardiac Implantable Electronic Devices (CIEDs)

6.7.2 Delivery in SGH cardiac theatre

If delivery is required in a theatre in SGH the call list in Appendix 2 should be completed to ensure that all the relevant staff have been informed.

6.7 Postnatal

Postnatal thromboprophylaxis as outlined in the delivery plan, specifying those women who need warfarin, or where either warfarin or LMWH may be suitable.

6.8 Contraception advice

For details see https://www.fsrh.org/standards-and-guidance/documents/ukmec-2016-summary-sheets/

6.8.1 Combined oral contraceptives should be avoided in patients at risk of thromboembolism (cyanosis, impaired cardiac function, atrial arrhythmias, Fontan-type circulation, and prosthetic heart valves) and in patients with hypertension (UK MEC 3/4).

6.8.2 Progesterone-only oral contraceptives do not increase the risk for thromboembolism Depot injections of progestogen or subcutaneous implants are an alternative to the progestogen-only oral contraceptives especially for adolescents for whom compliance is a concern

6.8.3 Progesterone IUS are highly effective and safe. However, in those congenital patients with pulmonary hypertension or Fontan-type circulation, intrauterine device insertion may

cause vagal stimulation and would require insertion in a hospital setting and therefore suitable to be inserted at time of caesarean birth.

6.8.4 Sterilisation should be considered for women in whom pregnancy would carry a prohibitively high risk or when a couple decide that they have completed their family.

6.9 Tertiary referrals

For non- maternity care providers referral can be done by emailing ANC.cardiac@uhs.nhs.uk. For maternity care providers referrals can be made via the Badgernet system (it will come into the ANC.Cardiac@uhs.nhs.uk email).

7. Roles and responsibilities

This guideline applies to all clinical staff employed or contracted by University Hospital Southampton (UHS) Foundation Trust who provide care to women. Staff have a responsibility to ensure that they are aware of this guideline and its contents. They should clearly document their rationale if they have not complied with the recommendations detailed in this guideline. It is the responsibility of department managers, consultants, team leaders and education leaders to ensure staff are aware of this guideline.

8. Communication and training plans

The guideline will be displayed on the Staffnet,and sent to the relevant Care Group clinical teams. The team leaders will be expected to cascade to all relevant staff groups. All medical, nursing and midwifery staff caring for women and newborns should have support and training in implementing the contents of the guideline. In addition, the guidelines will be included in local induction programmes for all new staff members.

The author is responsible for ensuring the effective dissemination of this guideline.
To ensure dissemination takes place and to avoid duplication of work, do not assume others will do this based on their involvement in guideline consultation process.

Methods of dissemination may include:

- Present the guideline at meetings e.g. ICC, MOST, MSG
- Discussion at mQuest
- Email correspondence e.g.
  - midwiferystaff@uhs.nhs.uk,
  - O&Gjuniordoctors@uhs.nhs.uk,
  - consultantobstetricians@uhs.nhs.uk,
  - consultantneonatologists@uhs.nhs.uk, W&Nanaestheticguidelineconsultationgroup@uhs.nhs.uk
- Theme of the Week (bear in mind busy schedule so may need to plan ahead)
- Communication board in birth environments and ward areas for discussion at handover
- Teaching sessions – involve Education team early in guideline consultation process

9. Process for monitoring compliance

The purpose of monitoring is to provide assurance that the agreed approach is being followed. This ensures that we get things right for patients, use resources well and protect our reputation. Our monitoring will therefore be proportionate, achievable and deal with specifics that can be assessed or measured.

Key aspects of this policy will be monitored:

Element to be monitored	• Women should have shared care during pregnancy involving cardiologists, obstetricians and obstetric anaesthetists • Women should be offered fetal echocardiography in the Fetal Medicine unit • Women should have a documented plan of care for their delivery using the electronic proforma • Women should receive advice about contraception before discharge
Lead (name/job title)	Nominated Registrar
Tool	Audit
Frequency	3 yearly
Reporting arrangements	Departmental Audit meeting

Where monitoring identifies deficiencies, actions plans will be developed to address them.

10. Document review

Guideline to be reviewed after three years or sooner as a result of audit findings or as any changes to practice occurs.

11. References

MBBRACE: Saving Lives, Improving Mothers' Care. Dec 2016

NHSE Clinical Commissioning Policy: Pre-implantation Genetic Diagnosis (PGD) April 2014Reference: E01/P/a

Knight M, Bunch K, Tuffnell D et al, Saving Lives, Improving Mothers' Care Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2018-2020. MBRRACE-UK, 2022

2018 ESC Guidelines on the management of cardiovascular diseases during pregnancy European Heart Journal (2018) 39, 3165–3241

UHS (2019) Diathermy Policy for Patients with Cardiac Implantable Electronic Devices Available at:Diathermy Policy for Patients with Cardiac Implantable Electronic Devices (CIEDs)

12. Appendices

Appendix 1:

Proposed standards for care of mothers with cardiac conditions in pregnancy for Wessex Region.

These standards are proposed following the MBRRACE-UK report on "*Saving Lives, Improving Mothers' Care"* published in 2016 which had a topic focus on cardiovascular disease in pregnancy.

The lessons on cardiovascular disease listed in the report included:

- Lack of co-location of obstetric and cardiac services jeopardises interdisciplinary working and communication. Measures such as joint obstetric cardiac clinics, multidisciplinary care plans, copying letters to the woman and all clinicians involved in her care, as well as staff from all specialties writing in the woman's hand-held notes may mitigate against the inherent risk of inadequate communication between specialists.

- Early involvement of senior clinicians from the obstetric and cardiology multidisciplinary team is important, wherever a pregnant or postpartum woman presents with suspected cardiac disease, but particularly if she presents to the Emergency Department.

- A raised respiratory rate, chest pain, persistent tachycardia and orthopnoea are important signs and symptoms which should always be fully investigated. The emphasis should be on making a diagnosis, not simply excluding a diagnosis.

- A normal ECG and/or a negative Troponin does not exclude the diagnosis of an acute coronary syndrome.

- New onset of cardiorespiratory symptoms and/or absence of valve clicks in women with prosthetic heart valves should prompt careful echocardiography and early review by a senior cardiologist to exclude the possibility of valve thrombosis.

Following this report, the Royal College of Physicians and Surgeons of Glasgow published recommended standards of care, which have been supported in subsequent MBBRACE reports. These standards are proposed in the 2016 document *"Addressing the Heart of the Issue: Good clinical practice in the shared obstetric and cardiology care of women of childbearing age".* From these we have taken the following standards for care in the Wessex region.

A: Organisation of Care

1. Each local unit should have a designated team who lead the care of women with cardiac disease. This should consist of an identified lead obstetrician, cardiologist and anaesthetist.

2. Ideally, women with heart disease who are pregnant should be seen jointly by the cardiologist and obstetrician together. This may not be possible or practical at all visits but may be particularly valuable in planning care at the beginning of pregnancy or in planning delivery at around 28 to 32 weeks. If it is not possible to meet jointly there should be prompt telephone/ virtualor email contact.

3. There should be clear referral criteria for referral to Southampton regional service (Appendix 1). For women where there is uncertainty about the need for referral there should be discussion with the regional service or the mother could be referred for a consultation and opinion.

4. A delivery plan, including post partum care, should be available and accessible for all pregnant women with heart disease. This includes those with WHO class I heart disease.

5. Pregnant women with WHO class III or IV heart disease should be referred to a regional obstetric service with cardiologist support within 4 weeks of presentation to antenatal services (see table below)

6. For women with predicted high risk pregnancy due to heart disease, the delivery location is provisionally determined between 28 to 32 weeks of gestation, with agreement from the MDT (which must include local and tertiary obstetricians, cardiologists and anaesthetists). The place of delivery may be clear earlier in pregnancy for mothers with either minor or complex disease where it is clear they could deliver locally or will need to deliver in the regional centre. The planned place of delivery may need to be changed later in pregnancy if there is a late change in maternal condition.

7. Specialist advice should be taken from the Southampton regional centre if any new triggers develop during pregnancy. Triggers for consideration of a change in location of delivery include:
a. new cardiac symptoms
b. deterioration in echo findings during pregnancy
c. deterioration in WHO class
d. deterioration in New York Heart Association (NYHA) class
e. concern from a member of the MDT.

8. For women with heart disease who are pregnant, a pathway should exist for the provision of care within office hours, and also out-with office hours.

9. Contact details for key persons are widely available for referring health professionals. Provisions are made for when that person/ team are on leave.

B: Aspects of pregnancy care

1. All women of child-bearing age who have heart disease, including those pursuing assisted conception, should be offered pre-pregnancy counselling and contraceptive advice by an appropriately trained healthcare professional including those based in primary care.
    a. Women with WHO class II heart disease pre-pregnancy counselling should be assessed by a cardiologist OR obstetrician.
    b. Women who are considered to have WHO class III or IV heart disease should be offered counselling with a cardiologist with expertise in the care of cardiac obstetrics and an obstetrician with a specialist interest in cardiac obstetrics.
    c. Women who are felt to be of uncertain risk category should be discussed further with the appropriate specialist team to establish the appropriate pre-pregnancy advice

2. For women with heart disease considering termination of pregnancy:
    a. Women with heart disease considering termination of pregnancy should be assessed for their WHO class.

    b. For women in WHO class III or IV heart disease, the best method and location of the procedure should be discussed with appropriate specialists in cardiology, obstetrics, anaesthetics and termination of pregnancy services.

3. For women with heart disease presenting acutely to the obstetric service or to other hospital services (e.g. cardiology or Emergency Department):

a. There should be involvement of senior clinicians from the obstetric and cardiology multidisciplinary team particularly for those with WHO class III or IV disease.

b. A raised respiratory rate, chest pain, persistent tachycardia and orthopnoea are important signs and symptoms which should always be investigated. Key investigations must not be delayed because of the pregnancy. The emphasis should be on making a diagnosis, not simply excluding a diagnosis. Traditional referral mechanisms may be too slow in pregnancy. *NB: One in five women who die from a cardiac cause die in an ambulance or Emergency Department*.

c. During acute admissions all women with cardiac disease admitted during pregnancy are discussed with the admitting consultant and on call obstetric consultant within the time set out in their delivery plan. Women with newly diagnosed cardiac conditions may need urgent discussion.

4. Postnatal care:
    a. All women with heart disease have a postnatal follow up arranged with the cardiology or obstetric team.
    b. Appropriate contraceptive advice should be given prior to discharge.

From the ESC guidance: Available here

Table 3 Modified World Health Organization classification of maternal cardiovascular risk

	mWHO I	mWHO II	mWHO II–III	mWHO III	mWHO IV
Diagnosis (if otherwise well and uncomplicated)	Small or mild – pulmonary stenosis – patent ductus arteriosus – mitral valve prolapse Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous drainage) Atrial or ventricular ectopic beats, isolated	Unoperated atrial or ventricular septal defect Repaired tetralogy of Fallot Most arrhythmias (supraventricular arrhythmias) Turner syndrome without aortic dilatation	Mild left ventricular impairment (EF >45%) Hypertrophic cardiomyopathy Native or tissue valve disease not considered WHO I or IV (mild mitral stenosis, moderate aortic stenosis) Marfan or other HTAD syndrome without aortic dilatation Aorta <45 mm in bicuspid aortic valve pathology Repaired coarctation Atrioventricular septal defect	Moderate left ventricular impairment (EF 30–45%) Previous peripartum cardiomyopathy without any residual left ventricular impairment Mechanical valve Systemic right ventricle with good or mildly decreased ventricular function Fontan circulation. If otherwise the patient is well and the cardiac condition uncomplicated Unrepaired cyanotic heart disease Other complex heart disease Moderate mitral stenosis Severe asymptomatic aortic stenosis 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^2, tetralogy of Fallot <50 mm) Ventricular tachycardia	Pulmonary arterial hypertension Severe systemic ventricular dysfunction (EF <30% or NYHA class III–IV) Previous peripartum cardiomyopathy with any residual left ventricular impairment Severe mitral stenosis Severe symptomatic aortic stenosis Systemic right ventricle with moderate or severely decreased ventricular function Severe aortic dilatation (>45 mm in Marfan syndrome or other HTAD, >50 mm in bicuspid aortic valve, Turner syndrome ASI >25 mm/m^2, tetralogy of Fallot >50 mm) Vascular Ehlers–Danlos Severe (re)coarctation Fontan with any complication
Risk	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 or severe morbidity	Extremely high risk of maternal mortality or severe morbidity
Maternal cardiac event rate	2.5–5%	5.7–10.5%	10–19%	19–27%	40–100%
Counselling	Yes	Yes	Yes	Yes: expert counselling required	Yes: pregnancy contraindicated: if pregnancy occurs, termination should be discussed
Care during pregnancy	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and cardiac disease	Expert centre for pregnancy and cardiac disease
Minimal follow-up visits during pregnancy	Once or twice	Once per trimester	Bimonthly	Monthly or bimonthly	Monthly
Location of delivery	Local hospital	Local hospital	Referral hospital	Expert centre for pregnancy and cardiac disease	Expert centre for pregnancy and cardiac disease

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ASI = aortic size index; EF = ejection fraction; HTAD = heritable thoracic aortic disease; mWHO = modified World Health Organization classification; NYHA = New York Heart Association; WHO = World Health Organization.

Appendix 2 – Call list for organising delivery in centre block theatre

Patient name: Hospital Number:

Caesarean booked for ___________________________ in Theatre __________ Centre Block
Aim to book caesarean during an elective caesarean list to ensure a theatre team are available and ask that all other cases are blocked

Service	Usual contact	Contact details	Date contacted
Theatre SGH	Cardiac nurse case managers Cardiac theatre coordinator	Blp 2166 Ext 8686 Bleep 2894	
Admin Team PAH	Enter name in Apex CS diary and block other cases that list	If cases need to be rearranged contact admin team EICS@uhs.nhs.uk	
Theatre PAH	Obstetric theatre coordinator	6310	
Obstetrician	Raji Parasuraman Consultant for elective list	4228, or alternative consultant secretary	
Obstetric anaesthetics	Poppy Mackie Sarah Napier Or duty anaesthetist	Bleep 2372	
Cardiac anaesthetics	Andy Curry or duty anaesthetist	Bleep 2251	
Adult congenital cardiologist	Aisling Carroll Sam Fitzsimmons	Through switchboard	
Midwifery	Maternity operational coordinator (*Midwife for elective list should usually cover)*	Bleep 2872	
SGH wards	Cardiac HDU Cardiac ITU Cardiac bed managers	6836 6121 Blp 2365	
Neonatal team 1. Technician 2. Doctors 3. Nurses	Ian Chapman Service consultant Nurse coordinator	Blp 1611, Ext 3582 Blp 1082 Blp 1623	

For emergency cases, especially out of hours, the same groups of staff will need to be informed but the individuals listed may not be available so the on-call equivalent will need to be informed. The individuals in bold are most likely to know the background to the women and should be phoned for advice if needed, even if they are not on duty. Information about the patient's condition and delivery plan should be available in the obstetric cardiac notes or, if these are not readily available, on E-Docs and Badgernet under scanned documents.

For completion once details confirmed

Patient Details:	Confirmed/ Name	Notes
Date of Caesarean		
Theatre		
Admission date/ time		
Admission place		
E TCI completed if admission to cardiac wards (cardiology team)		
Surgeon		
Obs anaesthetist		
Cardiac surgeon		
Cardiac anaesthetist		
Neonatal team		
Steroids required		
Medication required or to be stopped		
LSCS pre clerking date/ time		
Admission clerking required		
HDU/ ITU team aware and on APEX?		