Introduction to pregnancy and cardiovascular disease (CVD) and service structure in Scotland

NOTES

This document will use the term ‘women’/‘woman’ throughout. It is important to highlight that it is not only those who identify as women who require access to women’s health and reproductive services. For example, some transgender men, non-binary people, and intersex people or people with variations in sex characteristics may also experience pregnancy. All healthcare services should be respectful and responsive to individual needs.

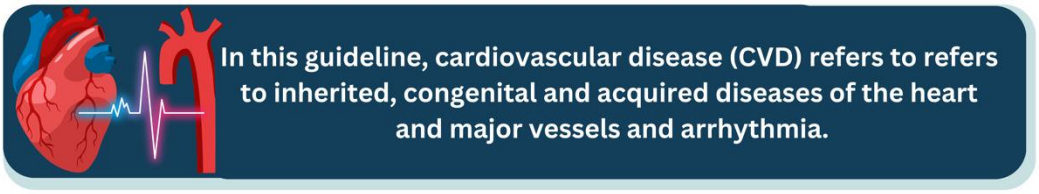
This guidance is not intended to be construed or to serve as a standard of care. Standards of care are determined based on all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guidance recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgement should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient’s case notes at the time the relevant decision is taken.

Contents

This document has been prepared by Public Services Delivery Scotland (PSD Scotland) on behalf of the Scottish Obstetric Cardiology Network (SOCN). Accountable to Scottish Government, PSD Scotland works at the heart of the health service providing national strategic services to the rest of NHS Scotland and other public sector organisations to help them deliver their services more efficiently and effectively. SOCN is a collaboration of stakeholders involved in obstetric cardiology care, who are supported by a PSD Scotland Programme Team to drive improvement across the care pathway.

Key Messages

Introduction



Cardiovascular disease (CVD) remains a leading cause of morbidity and mortality in pregnancy[1]. Several factors contribute to this risk including the physiological changes in pregnancy that result in haemodynamic, vascular, haematological, and metabolic change (Figure 1).

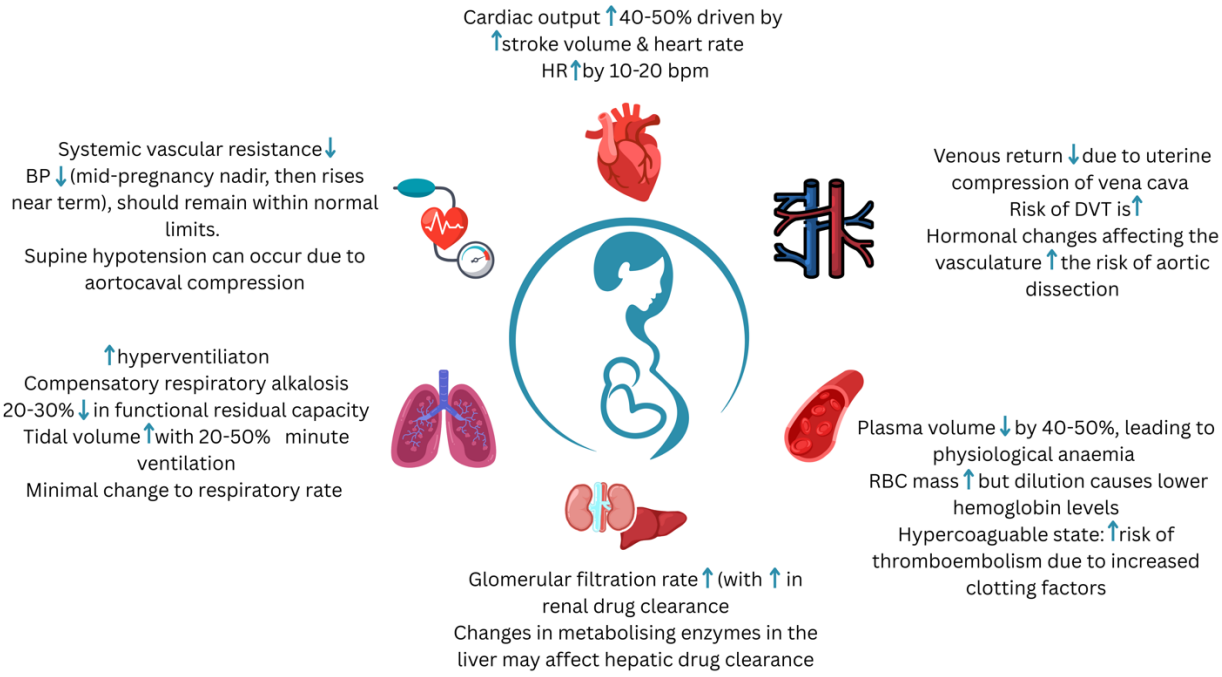


Figure 1: Summary of the physiological changes in pregnancy

During labour and early post-partum, physiological changes and medical management contribute further to altered haemodynamics. While most women with CVD will tolerate these changes, for others these changes exacerbate existing abnormal haemodynamics in women with known CVD or unmask previously unknown CVD. Maternal cardiac events can also have an impact on fetal outcome. Other contributors that increase risk include obesity, maternal age, co-morbidities and previous pregnancy complications (Figure 2).

Figure 2: Factors contributing to increased risk in pregnancy

Reviews into maternal deaths highlight recurring themes that impact the quality-of-care women of reproductive age receive[2,3]. This includes a lack of:

- access to preconception counselling and health optimisation
- access to the most appropriate healthcare professionals during pregnancy
- timely recognition from women and healthcare professionals of CVD as a cause for signs and symptoms
- absence of timely communication to the right professionals and appropriate escalation of care

Effective management and mitigation of risk for women of reproductive age with CVD requires early identification of pregnancy risks, meticulous planning, and individualised monitoring by a multidisciplinary team to enhance maternal and fetal outcomes.

In 2016 the Royal College of Physicians and Surgeons of Glasgow published ‘Addressing the Heart of the Issue’ presenting standards for good clinical practice in the management of women with CVD of reproductive age[4]. In 2018 SOCN was

commissioned to build on this by raising awareness of CVD in pregnancy by engaging with clinicians, policy makers and third sector organisations, identifying clinicians across Scotland involved in the management of women with CVD and gaps in care, delivering education and supporting the development of guidance and pathways.

SOCN has developed a range of guidance to promote a standardised, multi-disciplinary approach to the provision of preconception, antenatal, intrapartum and postnatal care for women with CVD in Scotland (www.socn.scot.nhs.uk).

Organisation of care & the pregnancy heart team

Organisation of care in Scotland

NHS Scotland provides access to local, regional and tertiary care across the range of services women with CVD may require in the context of pregnancy. In Primary Care, GPs and associated healthcare professionals play a key role in preconception care for women with CVD or who have risk factors for CVD as well as facilitating referral for preconception counselling, assisted reproductive therapies, and appropriate pregnancy follow-up. While many of these services will be available locally, NHS Scotland's commitment to equitable access to specialist care may require travel across health board boundaries and regional collaboration for complex cases.

Fertility Care

There are four NHS tertiary Fertility Centres in Scotland located in Aberdeen, Dundee, Edinburgh and Glasgow. The Fertility Scotland National Network provides additional information on treatments available and access criteria (https://fertility.scot/).

Termination of pregnancy care

Each territorial health board provides termination care. These services are listed on NHS Inform https://www.nhsinform.scot/tests-and-treatments/non-surgical-procedures/abortion/accessing-an-abortion/.

Maternity care

Maternity care in Scotland is delivered in Obstetric Units providing consultant obstetrician and midwife-led services, and midwife-led units. The Scottish Perinatal Network has more information on these units and their locations (https://perinatalnetwork.scot/maternity/maternity-units/).

Antenatal and intrapartum pathways have been published by Scottish Government and an overview is provided in Figure 3 with the full pathway document accessed https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-

guidance/2025/02/maternity-pathway-schedule-care-clinical-guidance-schedule/documents/title/title/govscot%3Adocument/title.pdf.

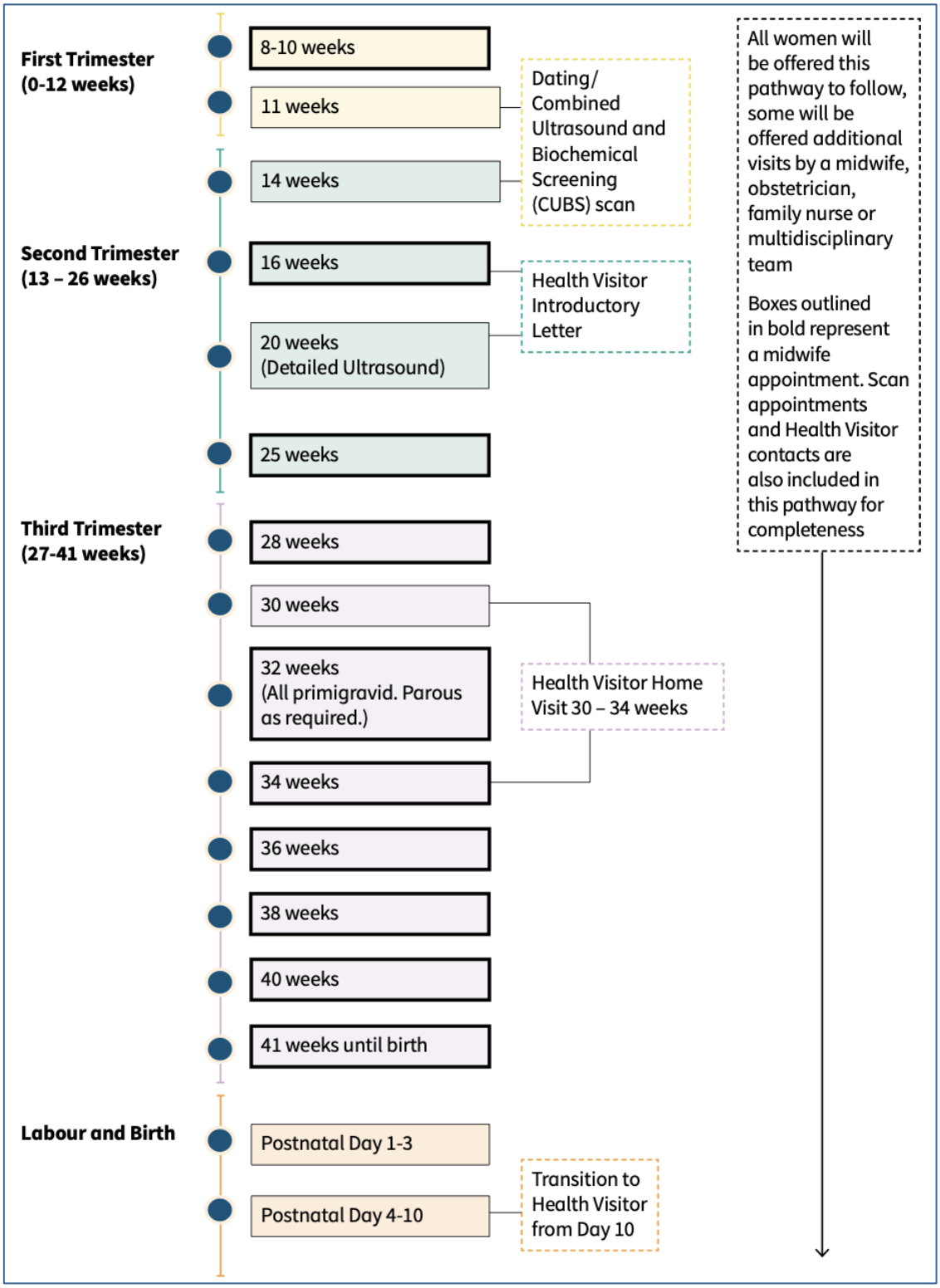


Figure 3: National pathway for minimum provision of antenatal care. Additional reviews will be required for women with CVD.

Neonatal care

Fetal wellbeing may have an impact on the location of care or delivery for a woman with CVD. Across Scotland there are Special Care Baby Units, Local Neonatal Units and Neonatal Intensive Care Units. In addition, the Scottish Neonatal Transport Service (ScotSTAR) supports the emergency care and transfer of newborn babies to an appropriate unit. The Scottish Perinatal Network provides additional information on these Units https://perinatalnetwork.scot/maternity/maternity-units/.

Cardiology care

Cardiology care in Scotland is provided by local, regional and tertiary centres that deliver inpatient and outpatient management, regional interventional and surgical services and national services. Current regional and national services include:

Regional cardiac surgery and transcatheter aortic valve implantation:

- Aberdeen Royal Infirmary (co-located with Obstetric Unit)
- Edinburgh Royal Infirmary (co-located with Obstetric Unit)
- Golden Jubilee National Hospital (linked Obstetric Unit Queen Elizabeth University Hospital)

Percutaneous coronary intervention:

- Aberdeen Royal Infirmary
- Ninewells Hospital (co-located with Obstetric Unit)
- Raigmore Hospital (co-located with Obstetric Unit)
- Hairmyres Hospital (linked Obstetric Unit Wishaw General Hospital)
- Edinburgh Royal Infirmary (co-located with Obstetric Unit)
- Golden Jubilee National Hospital (linked Obstetric Unit Queen Elizabeth University Hospital)

National Cardiac Services:

- Golden Jubilee National Hospital (linked Obstetric Unit Queen Elizabeth University Hospital)
  - Scottish National Advanced Heart Failure Service
  - Scottish Adult Congenital Cardiac Service
  - Scottish Pulmonary Vascular Unit
- Edinburgh Royal Infirmary (co-located with Obstetric Unit)
  - Percutaneous Mitral Valve and Related Interventions Service

Pregnancy heart team (PregHT)

What the guidelines say

It is recommended that high-risk patients are treated in specialised centres by a multidisciplinary pregnancy heart team

The European Society of Cardiology (ESC) introduced the term Pregnancy Heart Team (PregHT) to describe the core group of expert clinicians involved in the management of women with CVD in pregnancy[5]. Figure 4 provides a summary of key individuals involved in the core PregHT and wider PregHT.

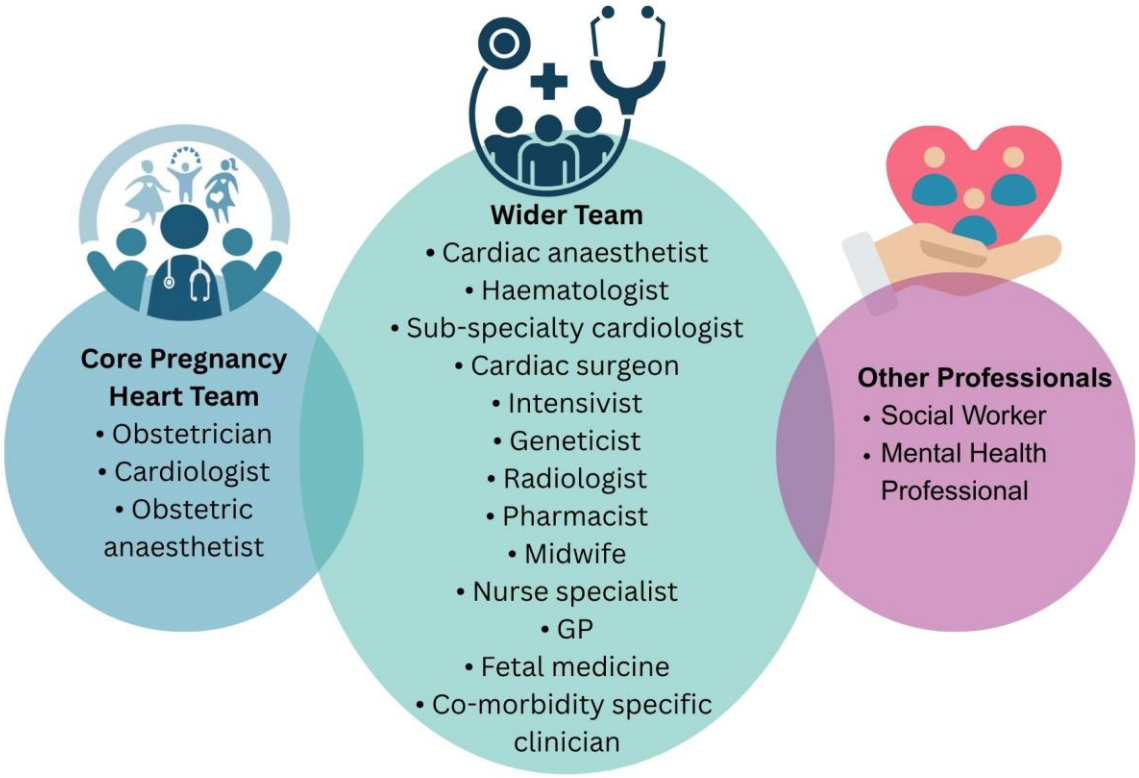


Figure 4: Core professionals involved in the PregHT

Through expert advice and timely, co-ordinated care, the PregHT are essential to optimise maternal and fetal outcomes[6,7]. The role of the PregHT extends beyond pregnancy to include preconception, postpartum and interconception care.

There is currently no regional or nationally commissioned PregHT in Scotland. In the absence of such a service, the responsibility for the delivery and management preconception, antenatal, intrapartum and postpartum care of women of reproductive age with CVD remains with local cardiology, maternity and healthcare services. Where additional specialist expertise is required, clinicians are encouraged to refer

patients to the regional PregHT for multidisciplinary input. A shared care approach should be maintained, ensuring that women receive coordinated management across both local and specialist services, tailored to their individual risk and clinical needs. Advocating for this model of care is a key remit of SOCN and should also be actively supported by local services to ensure equitable access to expertise across Scotland.

While this guidance highlights the complexity of care and the need for specialist input, it will be at the discretion of the regional PregHT to determine how they provide advice whether through written recommendations, virtual consultation, or direct patient review in clinic based on the individual clinical scenario and service capacity. One example of this approach is in access to echocardiography, an essential component of cardiac monitoring in pregnancy. As demand for imaging continues to stretch services, a shared-care model where local expertise in acquiring and interpreting echocardiographic images is supported by regional or specialist input could enable both local and specialist teams to obtain the necessary information to plan care effectively. Strengthening this collaborative approach would help mitigate workforce pressures while ensuring timely and accurate cardiac assessment for pregnant women across Scotland.

Defining levels of care for women with CVD

The level of care, location of care and healthcare professionals involved is determined by several factors:

- Baseline CVD
- Change in CVD status
- Co-morbidities and social determinants of health that add additional complexity/risk
- Availability of the PregHT and clinician expertise in cardiac obstetrics
- Access to healthcare
- Fetal complications
- Co-location of services or ability to mobilise expertise in acute settings

Recommendations for the location of preconception care, antenatal care and delivery for women with cardiac disease are based on the mWHO maternal cardiac risk guidance (see www.socn.scot.nhs.uk) and the availability of PregHT and cardiac obstetric expertise in Scotland

Local and regional expertise will vary and access to clinicians with the relevant experience across Scotland is essential. SOCN has developed separate guidance which provides information on cardiovascular conditions categorised by mWHO classification and appropriate levels of care for each unit (see www.socn.scot.nhs.uk).

For patients requiring review at a regional or specialist centre, antenatal and cardiac care will be coordinated with their local hospital to ensure streamlined management.

For example, a patient with severe left ventricular systolic dysfunction (LVSD) living in Kilmarnock may receive routine antenatal care and cardiac review locally while attending the regional PregHT clinic at the Queen Elizabeth University Hospital (QEUH) in Glasgow. Effective communication and coordination between sites, as emphasised in the antenatal care chapter, ensure continuity of care, avoids gaps in follow-up or unnecessary multiple visits. A regional centre may also be the local or specialist centre for some patients.

Regional PregHT input can take the form of clinician-to-clinician advice, virtual review or face-to-face review depending on the local expertise and clinical status of the patient. Specialist review requires face-to-face assessment with the relevant specialist service with the frequency determined by the patients clinical status and local or regional expertise.

For patients living in the Highlands and Islands, care location for local and regional review may vary e.g., Inverness, Glasgow, or Aberdeen, based on NHS agreements, maternal CVD, and proximity to social support.

Taking a Scotland specific approach, we have used the following categories to describe levels of expertise:

Local	Regional	Specialist
Cardiovascular conditions that can be managed locally in a *consultant* led maternity unit	Complex cardiovascular conditions where a regional Pregnancy Heart Team provides clinical review (either virtually or face-to-face according to clinical need) and on-going advice and guidance to a local maternity unit	High-risk cardiovascular conditions where care in pregnancy is led by the regional Pregnancy Heart Team during pregnancy and includes location for delivery and links with specialsit cardiac services

These categories reflect pre-existing CVD and do not account for complicating co-morbidities or social determinants of health. For example, a woman with an uncomplicated, repaired atrial septal defect with uncontrolled epilepsy will require preconception and antenatal care driven by clinicians with expertise in epilepsy with minor input from cardiology. Therefore, an individualised approach is required to ensure care is delivered in the most appropriate location for the woman and her baby. Centralising care for high-risk cases ensures that appropriate expertise and resources are available to manage potential complications.

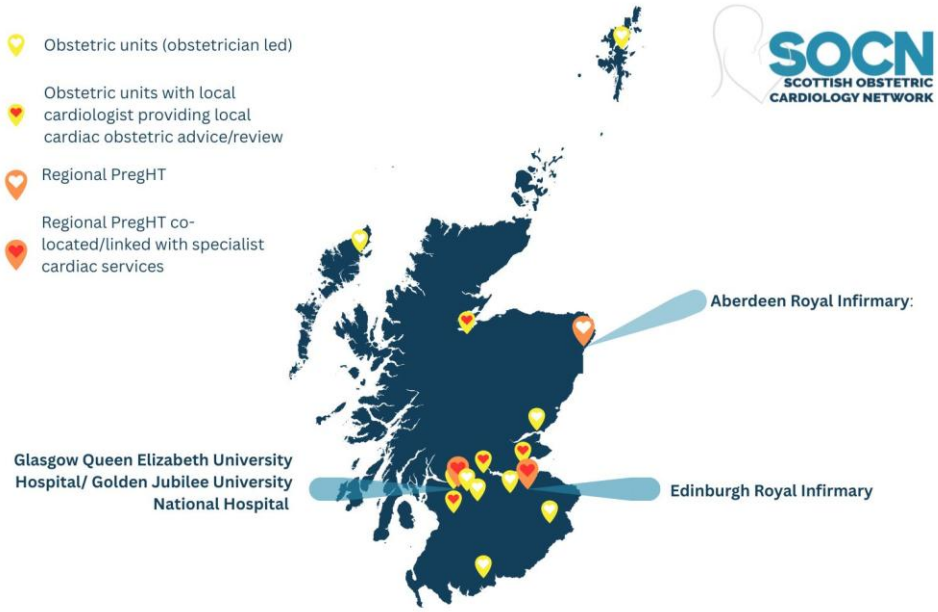


Figure 5: Location of obstetric units and Pregnancy Heart Teams in Scotland

Communication

Maternal mortality reports consistently highlight gaps in communication that contribute to adverse maternal and fetal outcomes. Key areas highlighted in these reports include inadequate communication with women prior to pregnancy, with other healthcare professionals during pregnancy and in timely escalation of care. Ways to mitigate these issues include:

- Early referral to appropriate specialists for preconception counselling to initiate risk assessment conversations to facilitate shared decision making
- Providing women with CVD who are pregnancy information to help them identify signs and symptoms that are not normal for pregnancy and how to seek help
- Assessing health literacy and any barriers to communication with patients. Where language barriers exist, utilise NHS translation services and do not rely on relatives to translate
- Using methods of communication that reduce delays for example phone, email and electronic referrals in addition/in place of letters that may take weeks to send
- Clear, structured information between secondary and primary care teams
- Use of an electronic multi-disciplinary care plan and ensuring it is accessible to healthcare professionals across Health Boards
- Ensuring identification and early involvement of senior clinicians, especially in the acute setting
- Regular multi-disciplinary discussions

- Utilise digital technology including virtual clinics and MDTs

Across Scotland there are commonly used systems for clinical records, however, each Board identifies their own requirements, and not all systems host the same breadth of information. The maternity records system Badgernet is used across Scotland except for NHS Lothian. Not all healthcare professionals have access to Badgernet. It would be appropriate for multi-disciplinary cardiac care plans to be shared, with the latest version clearly identifiable, across systems to ensure that regardless of where a pregnant woman presents, healthcare professionals can access contemporary information. If this is not available, healthcare professionals should contact obstetric services to request the information.

Resources

- A range of guidance developed by SOCN is available at www.socn.scot.nhs.uk including Risk stratification and location of care for women with cardiovascular disease. This document outlines the mWHO classification of maternal cardiovascular conditions and delivery of care including preconception, antenatal and intrapartum care.

- Maternity pathway and schedule of care: clinical guidance and schedule www.gov.scot/publications/maternity-pathway-schedule-care-clinical-guidance-schedule/

- Birthplace decisions Information for pregnant women and partners on planning where to give birth www.gov.scot/publications/birthplace-decisions-information-pregnant-women-partners-planning-give-birth-2/

- Transthoracic Echocardiographic Assessment of the Heart in Pregnancy—a position statement on behalf of the British Society of Echocardiography and the United Kingdom Maternal Cardiology Society https://echo.biomedcentral.com/articles/10.1186/s44156-023-00019-8

References

1. MBRRACE-UK, Saving Lives, Improving Mothers' Care 2024 - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2020-22 https://www.npeu.ox.ac.uk/mbrrace-uk/reports/maternal-reports/maternal-report-2020-2022

2. MBRRACE-UK, Saving Lives, Improving Mothers' Care 2019 - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2015–17
https://www.npeu.ox.ac.uk/mbrrace-uk/reports/maternal-reports/maternal-report-2015-2017

3. MBRRACE-UK, Saving Lives, Improving Mothers' Care 2023 - Lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2019-21
https://www.npeu.ox.ac.uk/mbrrace-uk/reports/maternal-reports/maternal-report-2019-2021

4. Royal College of Physicians and Surgeons of Glasgow, 'Addressing the Heart of the Issue' (2016)
https://rcpsg.ac.uk/college/speaking-up-for-the-profession/news-and-statements/heartoftheissue/

5. 2025 ESC Guidelines for the management of cardiovascular diseases during pregnancy. *European Heart Journal*, 46(43)
https://doi.org/10.1093/eurheartj/ehaf193

6. Reducing late maternal death due to cardiovascular disease - A pragmatic pilot study
https://pubmed.ncbi.nlm.nih.gov/30087040/

7. Team-Based Care of Women With Cardiovascular Disease From Pre-Conception Through Pregnancy and Postpartum: JACC Focus Seminar 1/5
https://pubmed.ncbi.nlm.nih.gov/33832604/

Appendix 1 - Document governance

Authors	This document was developed by the Known Pathways Subgroup on behalf of the SOCN Steering Group. Full membership of the group is available in Appendix 2.
Stakeholders involved	A wide range of health care professionals working in the area of obstetric cardiology were involved in the development of this document. This includes Obstetricians, Cardiologists, Anaesthetists, Pharmacists, Clinical Geneticists, Specialist Nurses, Midwives and Sexual Health consultants. Feedback from patients throughout the development of all of the SOCN materials was sought.
Methodology used	Evidence-based literature reviews and engagement with clinical experts within the field of obstetric cardiology across Scotland.
Rationale	Cardiac disease remains the leading indirect cause of death in pregnancy. The network was established to support and develop Obstetric Cardiology services throughout Scotland in improving standards of clinical care for pregnant women and their families affected by heart disease in pregnancy. The network supports the delivery of evidence based, patient centred care for both mother and baby through the development and implementation of clinical guidelines, care pathways, clinical standards and information resources.
Scope	The aim of this document is to support the delivery of services to improve outcomes for women with cardiac disease and support implementation of optimal care to any women with a cardiac condition who is contemplating a pregnancy or has a pregnancy in Scotland. .
Approval process	Members of the Scottish Perinatal Network and Network for Inherited Cardiac Conditions Scotland were able to review and provide feedback on the final draft of this document. The SOCN Steering Group endorsed this document on 30 April 2026**.** Full membership of the group is available in Appendix 2.

Network contact details

nss.socn@nhs.scot

Appendix 2 - Group membership

Known Pathways Subgroup Membership		
Name	**Job Title**	**Organisation**
Dr Julia Anderson	Consultant Haematologist	NHS Lothian
Dr Sonal Anderson	Consultant in Obstetrics & Gynaecology	NHS Ayrshire & Arran
Dr Katrina Bramley	Consultant Anaesthetist	NHS Lothian
Dr Adelle Dawson	Consultant Cardiologist	NHS Grampian
Dr Fiona Dennison	Consultant Obstetrician	NHS Ayrshire & Arran
Dr Richard Dobson	Cardiology Registrar	NHS Golden Jubilee
Jacqueline Dunlop	Principle Genetic Counsellor	NHS Tayside
Dr Stuart Hanna	Consultant Anaesthetist	NHS Forth Valley
Mary Hannaway	Senior Charge Midwife	NHS Greater Glasgow & Clyde
Dr Shahzya Huda	Consultant Obstetrician/Sub-group Chair	NHS Forth Valley
Dr Jayne Mclaren	A&E Consultant	NHS Ayrshire & Arran
Dr Lucy Michie	Obstetrics & Gynaecology Registrar	NHS Ayrshire & Arran
Dr Giles Roditi	Consultant Radiologist	NHS Greater Glasgow & Clyde
Maggie Simpson	Lead Clinician	NHS Golden Jubilee
Dr Caroline White	Consultant Cardiologist	NHS Lanarkshire

SOCN Steering Group Membership (2025/2026)		
Name	**Job Title**	**Organisation**
Dr Ros Burns	Obstetric Anaesthetist	NHS Lothian
Dr Rachel Darling	Consultant Anaesthetist	NHS Greater Glasgow & Clyde
Richard Forsyth	Health Systems Insights Manager	British Heart Foundation
Dr Patrick Gibson	Consultant Cardiologist	NHS Lothian
Dr Anja Guttinger	Sexual & Reproductive Health Consultant	NHS Ayrshire & Arran
Dr Duncan Hogg	Consultant Cardiologist	NHS Grampian
Dr Shahzya Huda	Consultant Obstetrician	NHS Forth Valley
Dr Vera Lennie	Consultant Cardiologist	NHS Grampian
Dr Lynn Miller	Consultant Cardiologist	NHS Fife
Lynsey Moir	Pharmacist - Clinical Cardiology	NHS Greater Glasgow & Clyde
Dr Rebecca Northridge	Consultant Obstetrician	NHS Tayside
Dr Karolina Pesz	Consultant Geneticist	NHS Greater Glasgow & Clyde
Maggie Simpson	Advanced Specialist Nurse	NHS Greater Glasgow & Clyde
Dr Lorna Swan	Consultant Cardiologist	Golden Jubilee National Hospital
Dr Niki Walker	Consultant Cardiologist	Golden Jubilee National Hospital