Royal College of Obstetricians & Gynaecologists

Guidance for maternal medicine services in the coronavirus (COVID-19) pandemic

Information for healthcare professionals

Version 2.5: Published Wednesday 9 December 2020

Summary of updates

Previous updates have been summarised in Appendix VIII. New updates for this version of the guideline are summarised here.

Version	Date	Summary of changes
2.5	9.12.20	**Throughout:** General update to ensure language represents current and evolving stages of the pandemic, including national guidance for individuals who are vulnerable, or extremely vulnerable, to the severe effects of COVID-19.
2.5	9.12.20	**Throughout:** Update to references and hyperlinks to ensure they represent current versions of documents and websites.
2.5	9.12.20	**1:** Added reference to the PregCOV-19 living systematic review findings on characteristics which place pregnant women at higher risk of severe COVID-19.
2.5	9.12.20	**3.1 and Appendices I–III:** Incorporates previously separate RCOG 'Guidance on self-monitoring of blood pressure in pregnancy' into this document, including minor edits to shorten content and ensure relevance across the UK.
2.5	9.12.20	**3.2.21:** Clarification that oral glucose tolerance tests should be the default screening method for gestational diabetes in pregnancy, unless it is unsafe or not possible to offer this service to women.
2.5	9.12.20	**3.8.2:** Section is now introduction to section 3.8.
2.5	9.12.20	**3.12:** Acknowledgement of studies which have identified that women with obesity are at increased risk of severe COVID-19.
2.5	9.12.20	**Appendices IV–VII:** Renumbered (previously Appendices 1–4)
2.5	9.12.20	**Appendix V:** Inclusion and description of references for studies which have evaluated the RCOG alternative screening protocols for gestational diabetes during the pandemic.

A note on the implementation of this guidance

RCOG guidance on suggested maternity service modifications during the COVID-19 pandemic has been developed to reduce the risk of nosocomial transmission of SARS-CoV-2, particularly to individuals who are most at risk of the severe effects of COVID-19, and to manage the impacts of acute changes within the NHS as a result of the pandemic (e.g. cancellation of elective services and staff shortages). The advice within this guidance is intended for implementation when the local risk of SARS-CoV-2 transmission is high and vulnerable individuals require protection.

Maternity services are advised to reflect on their local risk and return to providing clinical care as recommended by pre-existing local and national guidance (e.g. NICE antenatal care schedule, screening including for gestational diabetes) as soon as it is safe to do so. This may include maintenance of local initiatives commenced during the pandemic which have demonstrated an improvement in the quality and experience of care received by women.

A flexible approach is necessary to respond to fluctuations in risk from local or national COVID-19 prevalence and implications of local or national public health policy.

1. Introduction

During the COVID-19 pandemic, the UK Government identified pregnant women as being at higher risk of severe illness if they become infected with severe acute respiratory syndrome (SARS)-CoV-2 and develop COVID-19. Pregnant women are advised to be stringent with public health measures such as social distancing and self-isolation to lower their risk of COVID-19 exposure.[1] This has led to the rapid implementation of virtual access to antenatal care throughout the UK, ensuring women receive high-quality care and regular access to essential services while minimising the need for travel to antenatal clinics and in-person contact with healthcare staff.

Some pregnant women have comorbidities that require additional antenatal monitoring to optimise pregnancy outcomes. This guideline seeks to offer pragmatic advice to clinicians on the management of common medical disorders in pregnancy during the COVID-19 pandemic. It recognises that antenatal care is essential, but in this current climate the prerequisite to ensure the best possible pregnancy outcomes for women and their babies should be balanced against the need to protect particularly vulnerable women from the risk of SARS-CoV-2 infection.

This guidance has been written to provide specific recommendations during the COVID-19 pandemic on:

- Ideas for adaptation of maternal medicine services to safely reduce in-person contact during the coronavirus pandemic, for example by offering virtual consultations where appropriate, ensuring women are seen in one-stop clinics that cover all medical and obstetric needs in the same visit, avoiding unnecessary hospital admissions and offering new innovations, such as home monitoring of blood pressure, where it is safe to do so.

- Specific advice for healthcare professionals caring for pregnant women with coexisting medical comorbidities and suspected/confirmed COVID-19. These recommendations are made in addition to those that apply to non-pregnant adults with the same comorbidities.

It does not replace existing guidance produced by NICE, SIGN, the RCOG or specialist medical societies on the care of women with medical comorbidities in pregnancy, except where suggested modifications are described which are required to support social distancing measures and respond to staffing changes during the COVID-19 pandemic.

General considerations for the modification of antenatal care services during the COVID-19 pandemic can be found on the RCOG website.

In light of evolving data on pregnancy outcomes during the COVID-19 pandemic, it is important to bear in mind the findings from the UK Obstetric Surveillance System (UKOSS) and the living systematic review (PregCOV-19) studies.[2,3] The UKOSS study[2] included 427 pregnant women admitted to UK hospitals with confirmed SARS-CoV-2 infection between 1 March and 14 April 2020 in an interim report. The study showed pregnant women admitted to hospital for any reason who had SARS-CoV-2 infection were more likely to be of black or other minority ethnicity (adjusted OR [aOR] 4.49, 95% CI 3.37–6.00), have pre-existing comorbidity (aOR 1.52, 95% CI 1.12–2.06), be aged over 35 years (aOR 1.35, 95% CI 1.01–1.81) or be overweight (body mass index [BMI] 25–29.9 kg/m^2) or obese (BMI above 30 kg/m^2) (aORs 1.91, 95% CI 1.37–2.68 and 2.20, 95% CI 1.56–3.10, respectively). In the living systematic review[3] (77 studies, Dec 2019–June 2020) pregnant women

with chronic hypertension (OR 2.0, 95% CI 1.14–3.48; 858 women) and pre-existing diabetes (2.51, 95% CI 1.31–4.80; 858 women) were at greater risk of developing severe COVID-19 in pregnancy than those without these risk factors. These findings suggest that women with these risk factors were disproportionately affected by severe COVID-19,[3] or hospital admission with or for COVID-19.[2]

2. General advice for the adaptation of maternal medicine services during the COVID-19 pandemic

A senior obstetrician or clinician with a specialist interest in maternal medicine should assess all new referrals of pregnant women with medical disorders. Ideally any necessary additional blood tests should be taken at the booking appointment. This will facilitate planning for one-stop booking clinics, preventing the need for women to re-attend for additional tests when requested by the maternal medicine team or obstetric consultant.

Routine obstetric checks (e.g. measurement of fundal height, urine dip, blood pressure) conducted at midwifery appointments need not be repeated in maternal medicine clinics. Maternal medicine clinics may, therefore, be effectively run using telephone or video consultations instead of in-person encounters if appropriate. Virtual consulting reduces the need for women to travel and enter a hospital, and may therefore reduce their risk of infection. It also reduces footfall in the clinic making social distancing within the clinical area more achievable, as well as reducing the risk of infection to other women, vulnerable patients and hospital staff.

A minority of maternal medicine clinic appointments will need to be in person, primarily when the woman is having an obstetric scan, an echocardiogram or a blood test. In-person interactions should be limited by reviewing the purpose of the appointment in advance (ideally 1 week earlier) and aiming to administer all relevant tests/treatments in a single visit. A good basic principle is to 'piggyback' obstetric care onto medical care.

In a joint clinic, social distancing rules need to be observed in the consulting room, and by using appropriate technology, the obstetrician and physician need not be in same room.

When planning further appointments, clinicians should question whether they are medically necessary, whether they can be conducted virtually, and whether they can be combined with other essential appointments.

For first or repeat prescriptions, every effort should be made to promote remote prescription collection or delivery using available national services.

Referral for fetal growth scans is an important component of antenatal care for women with medical comorbidities. In response to the COVID-19 pandemic and potential effect on service capacity in sonography and fetal medicine departments, the following documents have been published by the RCOG and NHS England on how to prioritise ultrasound referrals:

- RCOG Guidance for antenatal screening and ultrasound in pregnancy in the coronavirus (COVID-19) pandemic.
- RCOG Guidance for fetal medicine units (FMUs) in the coronavirus (COVID-19) pandemic.

- NHS England Appendix G: Guidance for maternity services regarding fetal growth surveillance and management during the coronavirus (COVID-19) pandemic.

These adjustments will inevitably cause considerable anxiety among women and caregivers. Maternal medicine services should establish pathways and guidance for clinical and pastoral care of these women.

3. Specific considerations for the care of pregnant women with pre-existing comorbidities during the COVID-19 pandemic

The NHS has compiled a list of people at moderate risk, that is who are clinically vulnerable to severe COVID-19 disease.[1] These individuals are advised to be particularly stringent with social distancing measures. Other individuals with specific comorbidities have been identified as 'extremely vulnerable' to the severe effects of COVID-19; individuals who meet these criteria should check local restrictions and guidance on how to protect themselves.[4]

The following sections contain body system and disease-specific recommendations outlining:

- The elements of routine maternal medical antenatal care that are essential.
- The elements of care that could be modified to support national recommendations for social distancing of all pregnant women and for the more stringent 'shielding' group.
- Additional antenatal, or labour and birth considerations for women with comorbidities and coexisting SARS-CoV-2 infection.

For many of these comorbidities, there is no evidence to date to inform whether pregnant women are at higher risk of COVID-19 complications than those who are not pregnant. However, the comorbidities that render individuals more vulnerable to the consequences of SARS-CoV-2 infection have been identified. In making these recommendations, the risk of unrecognised maternal and fetal complications owing to pre-existing comorbidities has been balanced against the potential risks of SARS-CoV-2 infection. In addition, the potential resource constraints faced by hospitals during the pandemic have been considered.

Where possible, all women should continue to have routine antenatal care with their designated midwifery team (e.g. to include blood pressure and urinalysis), when they are not seeing their maternal medicine team. Further information can be found in the RCOG Guidance for antenatal and postnatal services in the coronavirus (COVID-19) pandemic.

3.1 Hypertension

Authors: Shakila Thangaratinam, Lucy Chappell

During the COVID-19 pandemic, self-monitoring of blood pressure during pregnancy and postnatally has been rapidly adopted for women with pre-existing hypertension, or hypertensive disorders of

pregnancy, in order to reduce in-person consultations while maintaining adequate safety for the woman and her baby. Further guidance on self-monitoring of blood pressure during pregnancy has been included in Appendices I–III.

3.1.1 Chronic hypertension

At the booking appointment, a blood test for urea and electrolytes (U&E) should be taken and a urine sample obtained to determine the protein : creatinine ratio (urinary PCR).

The obstetric team should review women at 10–14 weeks of gestation by virtual consultation (or in person if aligned with an 11–13 week scan) to assess risk status, to plan care and to make sure they are made aware how to access prescriptions for antihypertensive medication and low dose aspirin.

Arrangements should be made for women to self-monitor their blood pressure where possible and, if indicated, to check urine dipstick for proteinuria.

Obstetric reviews should be arranged to coincide with ultrasound scans. All other antenatal reviews should take place virtually as much as possible.

3.1.2 Pre-eclampsia

An in-person encounter is necessary to assess a woman with suspected pre-eclampsia. As well as the usual examination and investigations, placental growth factor (PlGF)-based testing, if available, should be carried out to help guide the decisions for diagnosis, hospital admission or timing of birth. The PlGF-based test is validated for use between 20^{+0} and 34^{+6} weeks of gestation.[5]

If a woman is diagnosed with pre-eclampsia, an in-person appointment with an obstetrician should be arranged to assess the severity of the condition and the wellbeing of the fetus.

In women with early onset pre-eclampsia (less than 34 weeks of gestation), healthcare professionals may consider using the NICE recommended risk calculators to determine the risk of complications.[5] In addition, the PREP-S validated risk prediction model should be considered to determine the risk of serious maternal complications or early preterm birth (at less than 34 weeks of gestation) at various time points from the time of diagnosis of pre-eclampsia.[5] Women whose risk status is predicted to be high should be offered admission and consideration given as to whether in utero transfer to a tertiary unit will be required. The fullPIERS model can also be used to predict the risk of maternal complications in women with pre-eclampsia and to help to plan care.[5]

If women with pre-eclampsia are cared for as outpatients:

- Arrangements should be made for them to self-monitor their blood pressure every 2 days and blood tests for pre-eclampsia should be carried out according to the NICE recommended schedule.[5]
- The intensity of monitoring should be adjusted according to predicted risk status and clinical findings.
- Healthcare professional review should take place twice a week. Ideally, in-person reviews should

occur at the time of blood tests or fetal growth scans.

3.1.3 Gestational hypertension

If a woman is diagnosed with gestational hypertension, arrangements should be made for her to self-monitor her blood pressure where possible and, if indicated, to check urine dipstick for proteinuria.

3.1.4 Antenatal corticosteroids for fetal lung maturation

With regard to the administration of maternal corticosteroids for fetal lung maturation, continued implementation of NICE guidance[6] is recommended where steroids are clinically indicated, but with a modification following a 2017 Cochrane review:

- 24–34^{+6} weeks of gestation: offer steroids
- 35^{+0}–35^{+6} weeks of gestation: consider steroids.[7]

In circumstances where steroids would normally be given, do not withhold them from a woman with COVID-19; as yet, there is no evidence from the COVID-19, SARS or Middle East respiratory syndrome (MERS) outbreaks that a course of steroids for fetal lung maturation causes any clinically significant deterioration of the woman's infection.

However, if birth is planned after 34^{+6} weeks of gestation, where the administration of steroids would require additional hospital visits, steroids should be withheld (on the basis that the benefit to the baby at this gestation would not justify the risk to the woman associated with two additional hospital visits). Women who are already hospital inpatients can be given steroids for fetal lung maturation in accordance with local policy.

3.1.5 Postnatal care

For all women with hypertensive disorders in pregnancy, postnatal antihypertensive medication should be reviewed with senior input, to optimise blood pressure control and minimise the length of postnatal stay in the hospital. Women should be advised to self-monitor their blood pressure at least two to three times in the first week post-discharge.

3.2 Diabetes and endocrine

Authors: Shakila Thangaratinam, Ponnusamy Saravanan, Mohammed SB Huda, Helen Murphy, Catherine Williamson

Sources of information that pregnant women with diabetes might find useful during the COVID-19 pandemic have been listed in Appendix IV; this includes a list of mobile apps which may be helpful to assist in glucose monitoring at home.

3.2.1 Pre-existing diabetes

Individuals with pre-existing diabetes have been identified as being more vulnerable to the severe effects of COVID-19, especially those women from black, Asian and minority ethnic (BAME)

backgrounds.[2] Women with pre-existing diabetes have been advised to stringently follow social distancing measures. Clinicians should encourage women to seek early advice if they have symptoms suggestive of COVID-19 infection while pregnant.

Additional tests at the booking appointment for pregnant women with pre-existing diabetes should include HbA1c, renal and thyroid function, and urinary PCR.

A clear referral pathway should be in place for women with pre-existing diabetes to be contacted by the diabetes antenatal team, with an early in-person review organised to coincide with the 11–14 weeks' scan and booking bloods. This review should cover:

- Blood glucose monitoring (continuous monitoring or sensor or finger prick) and the process for remote review of blood glucose control.
- Appropriate prescriptions for blood glucose and/or ketone monitoring, and medications that should be obtained by repeat prescription through primary care.
- Provision of additional materials to support blood glucose monitoring, diet and sick day rules (written and/or **online**).
- Information on hypoglycaemia avoidance and awareness for those using insulin.
- Prescription for folic acid and low dose aspirin.
- Home blood pressure monitoring/urinalysis if available.
- Plans for additional bloods to monitor diabetic control, aiming to keep blood sugar levels (monitored by HbA1c) below 48 mmol/mol.
- Care planning, to include the diabetic specialist nurse or midwife.[8]

Public Health England have issued guidance to public health commissioners that recommends pregnant women with diabetes should continue to be invited for retinal screening where possible, with the highest risk individuals being invited first, as detailed below:

1. Proliferative retinopathy
2. Pre-proliferative retinopathy in previous screening
3. Previously treated stable proliferative retinopathy
4. Background retinopathy and maculopathy in previous screening
5. Background retinopathy in previous screening
6. No previous screening within the last 2 years
7. No retinopathy within last 2 years of screening

The pregnancy specific pathway for diabetic retinal screening is running as normal within Scotland.

Consultations by the diabetes team for the purpose of reviewing home capillary blood sugar levels should be done virtually, wherever possible.

All women with pre-existing diabetes should continue to have routine antenatal care, ideally in a joint obstetric/diabetes clinic with a midwifery team (e.g. to include blood pressure and urinalysis).

The combined obstetric/diabetes team should aim to review the woman, in place of a midwifery appointment, at a minimum as follows:

- At 28 and 32 weeks of gestation; these visits should coincide with planned ultrasound appointments.

- At 36 weeks of gestation; a joint obstetric/diabetes review is recommended to comprehensively assess maternal and fetal health, and plan timing and mode of birth.

Close and regular phone or email communications between obstetric, diabetes and community midwife teams are essential to plan care and follow-up.[9]

With regard to antenatal corticosteroids, where these would normally be given for fetal lung maturation (e.g. suspected preterm labour), the guidance outlined in section 3.1.4 above should be followed.

Symptomatic women with COVID-19 should be made aware of the potential effects of the infection on their blood sugar control and should be advised to more frequently monitor home capillary blood sugars and ketones (where appropriate), which can be reviewed virtually by the diabetes team.

3.2.2 Gestational diabetes

3.2.2.1 Screening for gestational diabetes

Where the risk of SARS-CoV-2 transmission is high, maternity units should review their local processes to determine whether it is safe to offer 2-hour oral glucose tolerance tests (OGTT) in those women considered to be at high risk of gestational diabetes mellitus (GDM), as per the NICE guideline.[8]

The following modifications could be used as alternatives to OGTT. These are detailed in a suggested screening pathway (Appendix V), the rationale for which is detailed in Appendix VI:

- Women with HbA1c at 48 mmol/mol or above, or a random plasma glucose at 11.1 mmol/l or above, at booking should be cared for as having type 2 diabetes.

- Women with borderline HbA1c 41–47 mmol/mol, or random plasma glucose between 9 mmol/l and 11 mmol/l, at booking should be cared for as having GDM.

At 28 weeks of gestation, all remaining high risk women should have repeat HbA1c and fasting or random blood glucose levels measured, alongside their routine antenatal bloods. Fasting glucose is preferable where feasible.

- Women with either HbA1c at 39 mmol/mol or above OR fasting plasma glucose at 5.6 mmol/l or above OR random plasma glucose at 9 mmol/l or above will be diagnosed with GDM. Based on resources, clinical capacity and population characteristics, an alternative fasting plasma glucose concentration of 5.3 mmol/l or above may be the threshold used.

Additionally, at any time in pregnancy, women with one or more of the following indicators: glycosuria (2+ or above on one occasion or +1 on two or more occasions); high clinical suspicion of diabetes (symptoms – nocturia, thirst, polydipsia); or large for gestational age (LGA; 95th centile or above)/ polyhydramnios on ultrasound, should be tested for GDM.

Healthcare professionals may consider using a **risk prediction tool for GDM**, based on routine clinical information available at the time of booking.[10]

3.2.2.2 Antenatal care for women diagnosed with gestational diabetes

A flowchart detailing the suggested care for women with GDM is included in Appendix VII.

All women diagnosed with GDM should have an appointment with the diabetes midwife/nurse, who will provide training in the use of a glucose meter. Where feasible, this may be done virtually via video call. This should also be used as an opportunity to provide women with dietetic information and contact details of a dietician, where one is available.

In the week after receiving meter training, women should receive a virtual follow-up with the diabetes midwife/nurse and arrangements should be made for home capillary blood sugar levels to be checked by any suitable member of the diabetes team.

Routine antenatal care (e.g. measurement of fundal height where indicated, blood pressure and urinalysis) can otherwise continue as normal, ideally with the midwifery team.

Gestational diabetes controlled by diet

In women who have GDM that is diet-controlled, with blood glucose levels consistently in the target range (as per the NICE guideline),[8] no further hospital visits or ultrasound scans for fetal growth are needed.

Women should be provided with clear guidance on who to contact if they have more than three abnormal blood glucose levels in a week (or more than 10–15% of all readings) – this will usually be the diabetes antenatal team. It is possible that services may not be able to contact all women with GDM who are self-monitoring. It is, therefore, essential that women understand the responsibility of contacting the diabetes team if their readings are outside of specified targets.

Although community midwives are not expected to routinely check the mother's blood glucose readings, they should be provided with information on target blood glucose levels to help inform and support the mother, if needed.

Gestational diabetes controlled by metformin and/or insulin

In women who have GDM and are taking metformin and/or insulin, offer obstetric review remotely at

28 and 32 weeks of gestation to reassess the risk status. If in-person obstetric reviews are needed, for example in women with additional risk factors or poorly-controlled blood sugars, ensure these reviews coincide with any planned ultrasound appointments.

Offer obstetric review at 36 weeks of gestation to coincide with planned ultrasound assessment, to comprehensively assess maternal and fetal condition, plan timing and mode of birth, and plan follow-up care until birth.

As for women with pre-existing diabetes, antenatal corticosteroids for fetal lung maturation should be given, if indicated, in line with the guidance given in section 3.1.4 above.

Postnatally, women with GDM can be offered HbA1c screening at 3–6 months after birth instead of the current recommendation of 3 months.[8]

3.2.3 Hypothyroidism

Most women with hypothyroidism can be cared for as an outpatient.

Thyroid function tests (TFTs) should be sent with the booking bloods and/or taken at the time of the 20-week scan.

- If TFTs are within the normal range for pregnancy, the dose of thyroxine being administered should be maintained and thyroid function should be re-checked at 28 weeks along with routine bloods.

- If there is mild elevation of thyroid stimulating hormone (TSH) (e.g. up to 7.5 mIU/l), the thyroxine dose should be increased by 25–50 micrograms/day and blood taken to determine TSH and free T4 levels at the next in-person antenatal/midwifery review.

- If there is more marked elevation of TSH (above 7.5 mIU/l), thyroxine dose should be increased by 50 micrograms/day and blood taken for TSH and free T4 testing in 4 weeks or at next in-person antenatal/midwifery review (whichever occurs first).

- Telephone consultation with obstetric medicine/maternal medicine should be arranged.

- If there is low TSH or elevated free T4 levels and women have symptoms consistent with hyperthyroidism, the dose of thyroxine should be reduced by 25–50 micrograms/day and blood taken for TSH and free T4 testing 4–6 weeks later.

3.2.4 Other endocrine disorders

For the remaining endocrine disorders, e.g. hyperthyroidism, hypoadrenalism, hypercalcaemia and prolactinoma, care should continue as normal using virtual consultations where feasible.

At the booking appointment, all bloods including specific blood tests should be taken. For hyperthyroidism, TFTs should ideally only be sent once per trimester.

If using glucocorticoid treatment, this should be doubled if a woman is unwell with COVID-19.

3.3 Cardiovascular conditions

Authors: Rehan Khan, Kate von Klemperer, Catherine Nelson-Piercy

Pregnant women with significant congenital, or acquired, heart disease have been identified by the Chief Medical Officers as being extremely vulnerable to the effects of COVID-19.[4] A list of cardiovascular conditions which constitute significant heart disease in pregnancy has been defined by the UK Maternal Cardiology Society.[11]

Maternal cardiac disease represents a significant challenge during the pandemic because:

- It is a risk factor for maternal death and requires careful multidisciplinary care.[12]
- COVID-19 infection appears to carry a significantly greater risk of death in individuals with cardiovascular disease.[13]
- Public health measures which aim to lower the risk of COVID-19 exposure for women whose cardiac disease makes them extremely vulnerable, conversely increase the risk of women not receiving adequate pregnancy cardiac care.

Women with a well-functioning mechanical heart valve (MHV) are at higher risk in pregnancy because of thromboembolic complications and the need to manage their anticoagulation; they are not in the shielding group, but need very frequent encounters for measurement of anti-Factor Xa levels or international normalised ratio (INR).[14]The latter can be self-monitored using a Coagulocheck or similar commercially available device. Pregnant women with a MHV should be prioritised to be supplied with these monitors and the strips.

Women in this high risk group, as specified above, require care as follows:

- Local databases should be used to identify these women.
- Women in this group should be contacted to explain that limited in-person clinic visits should be planned to keep them safe from complications in pregnancy.
- In-person appointments should be planned to bring together care and investigations where possible, e.g. echocardiogram and fetal ultrasound scan, to minimise repeated hospital visits.
- Telephone/telemedicine consultations should be arranged when essential in-person investigations are not required.
- Women must be provided with reliable contact numbers to call with any care queries.
- Anaesthetic review should be planned as early as possible. Anaesthetist staff may be under huge pressure to look after ventilated COVID-19 patients elsewhere.

For women with MHVs, even when the local risk of SARS-CoV-2 transmission is high, arrangements should still be made for monitoring blood tests to be taken and the results reviewed. The anticoagulant regimen should not be changed in response to the pandemic.

The remaining pregnant cardiac patients (the majority) can largely be cared for virtually.

There is no specific guidance currently for the care of pregnant cardiac patients with COVID-19, but inevitably the care must be multidisciplinary and individualised, with particular considerations given to fluid management and assessment of cardiac function with echocardiography.

Pregnant women (and non-pregnant individuals) who become unwell with COVID-19 develop high troponin and high D-dimer levels.[15–17] D-dimer levels are normally elevated in healthy pregnancy, whereas cardiac troponin levels should remain within normal ranges throughout normotensive pregnancy. For pregnant women with COVID-19, elevation of these biomarkers may be associated with myocardial injury, but not necessarily with myocardial infarction or thromboembolic disease. Further investigation should be indicated by clinical signs and symptoms.

3.4 Respiratory diseases

Author: Rehan Khan

Individuals with chronic respiratory diseases, such as asthma or restrictive lung disease, are more vulnerable to the severe effects of COVID-19 and have been advised to make extra efforts with social distancing measures.[1]

Individuals with severe respiratory conditions including cystic fibrosis, severe asthma and severe restrictive lung disease are extremely vulnerable to the severe effects of COVID-19, and should follow local guidance.[4]

NICE has published a **COVID-19 rapid guideline** on severe asthma which outlines ways in which risk can be minimised, including specific considerations for investigation and treatment during the pandemic.

Where possible, pregnant women with all other respiratory conditions should be offered virtual consultations.

Pregnant women with underlying respiratory conditions who develop fever or cough should arrange to have a test for COVID-19 and be reviewed virtually to assess the severity of their illness. Those who are not coping at home should be assessed in hospital for COVID-19 and other common differential diagnoses.

3.5 Haematological conditions

Authors: Jahnavi Daru, Sue Pavord, Beverley Hunt, Susan Robinson

Individuals with hyposplenia are more vulnerable to the severe effects of COVID-19 and have been advised to stringently follow social distancing measures.[1] Clinicians should encourage these women to seek early advice if they have symptoms suggestive of COVID-19 infection while pregnant.

Individuals with cancers of the blood or bone marrow, bone marrow or stem cell transplants within the last 6 months, homozygous sickle cell disease or other inborn errors of metabolism (e.g. severe combined immunodeficiency) are extremely vulnerable to the severe effects of COVID-19, and should

be advised to follow local guidance, which may differ by severity of local risk.[4]

3.5.1 Anaemia

If pregnant women require treatment for mild-to-moderate anaemia, they should obtain ferrous sulphate or fumarate at community pharmacies and avoid hospital pharmacies if possible.

Women with haemoglobinopathies require a serum ferritin test before starting iron.

3.5.2 Anticoagulation

For women on low molecular weight heparin (LMWH), anti-Factor Xa monitoring is essential only in those with antithrombin deficiency and those who require treatment-dose LMWH for MHV. Anti-Factor Xa monitoring should be suspended in all other areas where local prevalence of COVID-19 is high, or the service is under pressure.

Women on vitamin K antagonists (e.g. warfarin) in pregnancy are very rare. They should be offered home testing equipment, e.g. the Coagulocheck or similar commercially available device, and instructed on how to use it, with dosing managed via email, text or telephone.

3.5.3 Haemoglobinopathies

Many women with haemoglobinopathies are from BAME communities, and therefore care should be taken to limit the number of hospital visits to reduce the risk of contracting COVID-19, owing to the associated higher risk of developing severe COVID-19 complications for those with a BAME background. When in-person appointments are necessary, these should be timed to coincide with other hospital attendances (e.g. transfusion sessions, blood tests, growth scans). Clinicians should encourage women to seek early advice if they have symptoms suggestive of COVID-19 infection while pregnant.

If women with homozygous sickle cell disease must attend hospital, clinicians (including paramedics where emergency attendance is required) should make arrangements to keep them protected from the risk of nosocomial SARS-CoV-2 transmission as far as possible.

Haematology and specialist obstetric multidisciplinary teams (MDTs) should consider setting up mechanisms for communication between centres to ensure clinical advice is continued in the event of staff absence.

If a woman with sickle cell disease has suspected/confirmed COVID-19:

- An urgent clinical review should be conducted, virtually where possible, by or in consultation with the woman's haematology team.
- Clinicians should consider common differential diagnoses as well as possible COVID-19, and decide whether offering an out-of-hospital test for SARS-CoV-2 is appropriate, in isolation or along with investigations for differential diagnoses.
- Clinicians are advised to have a low threshold for in-person review, given that individuals with

homozygous sickle cell are considered extremely vulnerable to its severe consequences.

- Usual care teams should maintain daily contact with the woman via telephone/video call.
- The symptoms of acute chest syndrome and COVID-19 overlap, with COVID-19 infection increasing the risk of the former, so clinicians should be extra vigilant for this complication.

Women should be encouraged to attend A&E or call 999 if any of the following occur:

- Uncontrolled pain, scoring more than 7/10, despite usual home analgesia.
- Respiratory distress (new shortness of breath or increased breathlessness compared to baseline, particularly at rest or on minimal exertion), with or without chest pain.
- Persistent fever with a temperature above 38°C.
- Severe headache, confusion or neurological changes.

3.5.4 Suspected venous thromboembolism (VTE)

Self-isolation or shielding at home is likely to cause a significant reduction in daily mobility, which may increase the risk of VTE in those pregnant women who need to stay at home.[18] Guidance on thromboprophylaxis is available in the RCOG guidance COVID-19 infection and pregnancy.[19]

Decisions on management of confirmed VTE should be made following existing clinical guidance[20] on a case-by-case basis, involving senior obstetricians, physicians and radiologists.

3.5.5 Inherited bleeding disorders

The management of inherited bleeding disorders is unchanged from the existing RCOG guidance.[21]

If care for women with these rare conditions is managed across multiple sites, a clear plan should be in place for management of bleeding antenatally, intrapartum and postpartum, ensuring availability of appropriate products at centres.

3.6 Renal disorders

Authors: Maggie Blott, Rehan Khan, David Williams

Individuals with chronic kidney disease (CKD) have been identified as more vulnerable to the severe effects of COVID-19 and have been advised to stringently follow social distancing measures.[1] Pregnant women with CKD stage 4–5 (glomerular filtration rate less than 30 ml/min or serum creatinine above 180 µmol/l) are at high risk of adverse pregnancy outcomes.

Women with CKD should have a joint consultation with the renal team and consultant obstetrician to plan antenatal care between 10 and 14 weeks of gestation. Ideally, this should be done on the same day as the booking appointment. Thereafter, renal and obstetric assessments should be combined and conducted virtually where possible.

Women should be enabled to self-monitor their blood pressure and urine dip at home and appropriate contact details should be provided in order to discuss results. According to CKD type and severity, serial monitoring of maternal renal function, blood pressure and urinalysis, as well as fetal growth, will be necessary and appointments with different specialties should be coordinated to take place simultaneously where possible.

Frequent hospital appointments prior to 20 weeks of gestation are unnecessary provided that blood pressure and urine testing is undertaken and reviewed virtually. Arrangements for antenatal care will depend on the complexity of each individual case.

The Renal Association has published guidance on pregnant women with CKD during the COVID-19 pandemic.[22]

3.7 Women with a renal transplant

Individuals who have received a renal transplant and who take immunosuppressive therapy are extremely vulnerable to the effects of COVID-19.[4] However, they still require the same amount of monitoring in pregnancy for signs of deterioration of graft function, tacrolimus/ciclosporin levels and maternal/fetal complications.

To minimise risk of infection, women in this category should be offered appointments at the start of clinics where possible, or outside of regular clinics (where local facilities exist).

The British Transplantation Society and the Renal Association have published joint guidance on the management of transplant recipients diagnosed with COVID-19.[23]

3.8 Neurological conditions

Authors: Shakila Thangaratinam, Dougall McCorry

Individuals with motor neurone disease, multiple sclerosis (MS), a learning disability or cerebral palsy have been identified by Chief Medical Officers as being more vulnerable to the severe effects of COVID-19 and have been advised to stringently follow social distancing measures.[1]

The Association of British Neurologists has clarified this advice with guidance on COVID-19 for people with neurological conditions.[24]

Where possible, all neurology consultations should be conducted virtually.

3.8.1 Epilepsy

Epilepsy is not thought to increase the risk to women of the severe effects of COVID-19, and pregnant women with epilepsy should follow the advice given to all pregnant women to stringently engage with social distancing measures.
Women considered to be at significant risk of seizures should have a joint obstetric and neurology care plan for pregnancy, intrapartum and the postnatal periods. MDT meetings can be conducted virtually, and the plan should be documented and communicated to all care providers. The EMPiRE

calculator can help to provide risk estimates of having seizures in pregnancy to women not on sodium valproate.[25]

Where possible all consultations with the epilepsy specialist teams should be offered virtually.

Blood levels for antiepileptic drugs are unlikely to alter clinical management and should be considered only if they would inform the assessment of drug toxicity or adherence to treatment.

During the COVID-19 pandemic, fetal growth scans in women with epilepsy should be performed only if there are concerns about the size of the baby following fundal height measurement. A detailed scan for fetal cardiac abnormalities should be part of the 20-week anomaly scan.

Healthcare professionals should be aware that women with epilepsy are at high risk of depression during the postpartum period. This has the potential to be worse in the pandemic situation and should be screened for appropriately.

3.9 Gastrointestinal conditions

Authors: Rehan Khan, Bel Kok

3.9.1 Chronic liver disease

Individuals with chronic liver disease have been identified as being more vulnerable to the severe effects of COVID-19 and have been advised to stringently follow social distancing measures.[1]

Antenatal appointments with obstetricians and physicians should be offered as virtual consultations by default.

Women should be stratified into those with stable autoimmune disease versus those with a risk of portal hypertension. Where there is a risk of portal hypertension, seek advice from the local liver MDT. During the COVID-19 pandemic, routine endoscopy services may not be available. Where varices cannot be ruled out, consider commencing carvedilol and request an experienced surgeon to attend a caesarean birth, and anticipate the risk of bleeding (in case of undiagnosed abdominal varices).

3.9.2 Inflammatory bowel disease

The British Society of Gastroenterology has published guidance for management of inflammatory bowel disease during the COVID-19 pandemic.[26]

Women should continue taking their usual inflammatory bowel disease therapy. If medications are stopped without discussion with the clinical team, there is a risk of disease flare. Active disease is associated with an increased risk of infection, exposure to steroids, fetal growth restriction, preterm labour, hospitalisation and major surgery, all of which can have more serious consequences than COVID-19 infection.

Serial growth scans are not indicated unless there is a periconception flare or more than one antenatal flare.

3.9.3 Obstetric cholestasis

Author: Lucy Chappell

The following guidance has been adapted from the draft RCOG Green-top Guideline on Obstetric Cholestasis,[27] using updated evidence from a meta-analysis published in 2019.[28]

If a pregnant woman presents with itching and no other red flag symptoms or signs, a non-fasting blood sample for liver transaminases and bile acids should be offered, which can be done in the community. Fetal movements should be established through discussion with the woman to assess fetal wellbeing. Additional fetal scans or cardiotocographs (CTGs) are not indicated by obstetric cholestasis alone.

Women with normal blood results whose itch persists, and have no other apparent cause established, should have repeat liver function tests and bile acid measurements taken at any subsequent in-person appointments (depending on gestation and clinical context).

If serum bile acids are above the normal range, explain the diagnosis of obstetric cholestasis (this can be done by telephone/videoconference):

- Women should be advised that no treatments are currently proven to reduce adverse perinatal outcomes, but aqueous cream (with or without menthol) and chlorphenamine (both available over-the-counter) may provide some symptomatic relief.

- Women should be reviewed in 1–2 weeks by telephone/videoconference. However, women should be instructed to contact the maternity unit sooner for telephone advice if symptoms worsen.

- Women should be advised to report dark urine, pale stools, yellow conjunctivae, reduced fetal movements or any other causes for concern.

If bile acids are below 100 µmol/l at diagnosis, repeat bile acid testing should be offered at any in-person appointments held from 34 weeks of gestation, or at 37 weeks of gestation as a minimum, in order to guide delivery timing. If bile acids remain below 100 µmol/l, a planned birth at 39 weeks should be considered.

If bile acids are 100 µmol/l or above, a repeat blood test for alanine aminotransferase and serum bile acids at 34 weeks of gestation should be offered. If they remain raised, the benefits and risks of planned birth at 35–36 weeks of gestation should be discussed with the woman.

If bile acid concentrations rise and then fall (without treatment), it is uncertain whether any further intervention will be needed and this needs to be explained to the woman.

3.9.4 Hyperemesis gravidarum

Women will continue to need hyperemesis gravidarum care, but in a pandemic situation the usual liaison with emergency medicine is not achievable.

Women should be advised to call early pregnancy units to report concerns regarding nausea and vomiting in pregnancy in the first instance.

The PUQE scoring system should be used to stratify women into those with mild, moderate and severe symptoms, and to guide care either through prescription of oral antiemetics or by attendance at an early pregnancy unit.[29] Clear arrangements should be made for women to receive any advised prescription following a telephone consultation.

Services should plan how to best configure their local protocols during the pandemic for women who require parenteral rehydration. This might include hospital at home, day-case or inpatient admission services.

Hyperemesis care should otherwise remain unchanged; this includes considering prescription of corticosteroids in those women for whom standard therapies have failed. As with any prescription during pregnancy, an offer of steroids should take into consideration the risks and benefits and a woman should be counselled accordingly.[30] During the pandemic, this counselling should convey that short-term steroid use temporarily places the woman in a group that are considered to be 'extremely vulnerable' to the severe effects of COVID-19.[4]

Hyperemesis can impact on a woman's mental health, which could be more negatively affected by the pandemic, so mental wellbeing should be discussed and screened for during all reviews, including those conducted virtually.

3.10 Rheumatological conditions

Author: Rehan Khan

NHS guidance for rheumatological diseases acknowledges that immunosuppression is a risk factor for COVID-19.[1] However, the British Society of Rheumatology advises that all patients should continue to take their medication unless directed otherwise by their rheumatology team or GP.[31]

The British Society of Rheumatology has produced a **risk stratification guide for rheumatology to identify those individuals considered 'extremely vulnerable' to the effects of COVID-19**.[31]

NICE has published a **rapid guideline for adults with rheumatological autoimmune, inflammatory and metabolic bone disorders** during the COVID-19 pandemic.[32] This makes specific recommendations on how to minimise risk, manage medications (including immunosuppressants) in individuals with or without COVID-19 and monitor drug treatment.

Routine bloods tests should be deferred until the end of any self-isolation/shielding period.

If pregnant women develop symptoms of any infection, established practice should be followed and immunosuppressive therapy paused for the duration of the infection and until they feel well, in consultation with their rheumatology team. For those on glucocorticoids or biologics treatment should not be stopped abruptly and advice should be sought from those caring for the woman.

3.11 Immunodeficiency

Authors: Liat Sarner, Matthew Hogg, Rehan Khan

Individuals with a weakened immune system as a result of conditions, such as HIV, or because of medication, such as corticosteroids or chemotherapy, are vulnerable to the severe effects of COVID-19 and have been advised to stringently follow social distancing measures.[1]

Pregnant women taking immunosuppressive medicines should continue to take them if medically indicated and they should not be stopped because of the pandemic.

3.11.1 HIV

The British HIV Association has produced a **statement on care of pregnant women living with HIV during the pandemic**.[33]

Care should be delivered virtually by the HIV in pregnancy MDT (HIV specialist physician, HIV nurse, HIV midwife, obstetrician with a specialist interest in HIV). Frequency of monitoring may be reduced based on clinician assessment of HIV treatment and its efficacy but, as a minimum, the following should still be done:

- One initial contact with a member of the HIV MDT (virtual or in person), combined with a booking and dating scan, if possible.
- Blood tests as per usual practice should be added to the booking sample.
- One second trimester contact (virtual or in person), combined with anomaly scan, if possible.
- One final visit in person at 36 weeks of gestation for blood tests and confirmation of the birth plan.
- Should further support be required antenatally and/or postnatally, virtual follow-up by telephone/videoconferencing is encouraged.

The risks of breastfeeding in this group of women should be discussed with the woman. This should include a discussion of the risks involved in attending for monthly maternal and infant viral load for the duration of breastfeeding and for 2 months' post-cessation, during the COVID-19 pandemic.

3.12 Obesity

Author: Shakila Thangaratinam

Individuals with a body mass index (BMI) of 40 kg/m^2 or more have been identified by the Chief Medical Officers as being more vulnerable to the severe effects of COVID-19 and have been advised to stringently follow social distancing measures.[1] Furthermore, multiple other studies have identified that either being overweight (BMI 25–29.9 kg/m^2) or obese (BMI above 30 kg/m^2) are associated with an increased risk of being severely unwell with COVID-19.[2,3,34]

- An initial obstetric review can be planned as normal but should be conducted virtually if possible.

- Further care should be organised virtually where possible. In-person obstetric appointments should be coordinated to coincide with other planned hospital appointments such as blood tests, ultrasound scans and anaesthetic reviews.

- Anaesthetic assessment for women with obesity should be offered as per local protocols.

3.13 Cancer

Author: David Williams

During the COVID-19 pandemic, pregnant women with cancer are categorised as vulnerable on account of both their pregnancy and their cancer. These women have voiced concerns about their need to attend hospital for antenatal and oncology care. They are particularly concerned that cancer care may be neglected as clinicians are required to divert their attention to coronavirus.

Cancer care in pregnancy should be tailored to the individual. During the COVID-19 pandemic a plan for antenatal care should be agreed between the woman, her lead obstetrician and oncology team. This plan should consider the woman's state of health, gestation of pregnancy, timing of childbirth and the type, stage and treatment of her cancer. This plan should aim to minimise the number of routine visits to hospital. Where possible investigations should be planned to coincide with a single hospital visit.

Most pregnant women with a history of successfully treated cancer require routine antenatal care. This should be offered with reference to the RCOG **guidance on antenatal and postnatal services during the COVID-19 pandemic**.

Fetal scans, blood tests and physical examinations are a necessary part of antenatal care and require attendance at hospital. These tests may need to be more frequent as a consequence of the underlying cancer.

Chemotherapy may need to be delayed until a woman has recovered from COVID-19. Otherwise the treatment of her cancer should remain unchanged as a consequence of the COVID-19 pandemic.

Breastfeeding should be supported in women who are well enough to feed their newborn and who are not taking a contraindicated chemotherapy agent.

3.14 Preconception counselling

Author: Rehan Khan

Preconception counselling in a hospital setting, for women with medical problems, should be deferred during the pandemic and replaced with virtual consultations.

4. Investigation of pregnant women presenting to acute services with symptoms which might be indicative of COVID-19

During the pandemic women will continue to present with symptoms warranting medical input, but medical teams may not be able to provide a prompt review.

The investigation of potential COVID-19 in a pregnant woman should follow national guidelines for adults.[35] Women presenting with fever, cough, headache, shortness of breath or any other symptoms suggestive of COVID-19 should still be fully investigated according to the usual principles, considering all differential diagnoses.

The use of the Royal College of Physicians Acute Care Toolkit 15 is advised.[36]

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Authors

Professor Shakila Thangaratinam (Professor of Maternal and Perinatal Health, University of Birmingham and Consultant Obstetrician Maternal Medicine, Birmingham Women's and Children's NHS Foundation Trust), **Mr Rehan Khan** (Consultant Obstetrician Maternal Medicine, Barts Health NHS Trust), **Dr Maggie Blott** (Consultant Obstetrician Maternal Medicine, Royal Free NHS Trust), **Professor Catherine Nelson-Piercy** (Professor of Obstetric Medicine, King's Health Partners and Guy's and St Thomas' Foundation Trust), **Dr David Williams** (Consultant Obstetric Physician, University College London Hospital), **Dr Sophie Relph** (Clinical Research Fellow, Department of Women and Children's Health, King's College London and RCOG Obstetric Fellow)

Section authors

Dr Katherine von Klemperer (Consultant Cardiologist, Barts Health NHS Trust), **Dr Jahnavi Daru** (Obstetric Specialist Trainee, Barts Health NHS Trust and Queen Mary University of London), **Dr Sue Pavord** (Consultant Haematologist, John Radcliffe Hospital and Associate Senior Lecturer in Medicine, St Edmund Hall, University of Oxford), **Professor Beverley Hunt** (Professor of Thrombosis and Haemostasis, King's College London and Consultant Haematologist, Guys and St Thomas' NHS Foundation Trust), **Dr Susan Robinson** (Consultant Haematologist, Guys and St Thomas' NHS Foundation Trust), **Professor Ponnusamy Saravanan** (Professor and Consultant in Diabetes, University of Warwick), **Dr Mohammed Huda** (Consultant Diabetologist, Barts Health NHS Trust), **Professor Helen Murphy** (Clinical Professor in Medicine [Diabetes and Antenatal Care], University of East Anglia and Consultant Physician, Cambridge University Hospitals NHS Foundation Trust), **Dr Dougall McCorry** (Consultant Neurologist, University Hospital Birmingham), **Dr Klaartje Bel Kok** (Consultant Gastroenterologist, Barts Health NHS Trust), **Professor Lucy Chappell** (Professor of Obstetrics, King's College London and Consultant Obstetrician, Guy's and St Thomas NHS Foundation Trust), **Dr Liat Sarner** (Consultant in Sexual Health, Barts Health NHS Trust), Mr **Matthew Hogg** (Consultant Obstetrician [Maternal Medicine], Barts Health NHS Trust), and **Professor Catherine Williamson** (Professor of Women's Health, King's College London and Consultant in Obstetric Medicine, Guy's and St Thomas' NHS Foundation Trust).

RCOG COVID-19 Guidance Cell

Mr Edward Morris (President, RCOG), **Professor Tim Draycott** (Vice President for Clinical Quality, RCOG), **Professor Patrick O'Brien** (Vice President for Membership, RCOG), **Dr Andrew Thomson** (COVID Guidance Development Lead, RCOG), **Dr Mary Ross-Davie** (Director for Scotland, Royal College of Midwives), **Dr Corinne Love** (Senior Medical Officer, Obstetrics, NHS Scotland), **Dr Jennifer Jardine** (Clinical Fellow, RCOG), **Dr Sophie Relph** (Clinical Fellow, RCOG), **Dr Sayaka Okano** (Honorary Clinical Fellow, RCOG), **Dr Michael Shea** (Honorary Clinical Fellow, RCOG), **Louise Thomas** (Head of Quality Improvement, RCOG), **Emma Gilgunn-Jones** (Director of Media and PR, RCOG), **Jenny Priest** (Director of Policy and Public Affairs, RCOG), **Farrah Pradhan** (Interim Business Manager, RCOG), **Michelle Sadler** (Guidance Editorial Manager, RCOG) and **Stephen Hall** (Political Advisor to the President, RCOG).

These individuals were, but are not currently, members of the guidance cell and have contributed to earlier versions of this document: **Dr Gemma Goodyear** (Obstetric Fellow, RCOG), **Dr Christine Ekechi** (Honorary Clinical Fellow, RCOG), **Dr Jahnavi Daru** (Honorary Clinical Fellow, RCOG), **Dr Anushka Tirlapur** (Honorary Clinical Fellow, RCOG), **Gemma Thurston** (Business Manager, RCOG), **Gozde Zorlu** (Media and PR Manager, RCOG) and **Anita Powell** (Senior Director for Clinical Quality, RCOG).

Acknowledgments

The authors wish to thank the following individuals for kindly peer reviewing part or all of this guideline: **Professor Jenny Myers, Professor Fionnuala McAuliffe, Marcus Green** (on behalf of Action of Preeclampsia), **Dr Surabhi Nanda, Miss Kate Harding, Dr R Katie Morris** (on behalf of the British Maternal and Fetal Medicine Society), **Dr Ellen Knox, Dr Tracey Johnston, Professor Jim Thornton, Dr Matthew Jolly** and colleagues (NHS England and NHS Improvement), **Emma Crookes** (Women's Voices, RCOG), **British Intrapartum Care Society**, **British Maternal and Fetal Medicine Society**, and the Chairs and Shadow Chairs of the **RCOG Guidelines Committee**.

We also wish to thank: **Dr Lucy Mackillop, Professor Asma Khalil, Mr Kim Hinshaw,** and **Dr Sophia Stone** for rapidly reviewing Appendices I–III, when it was previously published as a standalone guidance document.

Appendix 1

1. Introduction

The COVID-19 pandemic has required the NHS to urgently consider blood pressure self-monitoring in order to reduce in-person consultations for pregnant and postnatal women, while maintaining adequate safety for the woman and her baby.

Blood pressure self-monitoring in pregnancy can either be used to replace blood pressure measurements on the day of a scheduled clinic (i.e. intermittently) or can be done routinely and more frequently (e.g. daily or weekly) in addition to usual care.

2. Women for whom self-monitoring of blood pressure in pregnancy should be considered

2.1 Inclusion criteria

There are three groups of women to whom providers may wish to offer blood pressure self-monitoring, summarised in the table below.

Group	Description
1. Currently hypertensive women (Priority)	Women with chronic hypertension, gestational hypertension or pre-eclampsia
2. Normotensive women considered at higher risk of pregnancy hypertension using NICE guidelines	Women with one of the following risk factors: • hypertensive disease during a previous pregnancy • chronic kidney disease • autoimmune disease (e.g. systemic lupus erythematosus or antiphospholipid syndrome) • type 1 or type 2 diabetes Women with two of the following risk factors: • first pregnancy • age 40 years or older • pregnancy interval of more than 10 years • BMI 35 kg/m2 or more • family history of pre-eclampsia • multi-fetal pregnancy
3. Normotensive women	All other normotensive pregnant women as part of standard antenatal care (including those who may need to self-isolate for a period)

Offer of self-monitoring should be prioritised in accordance with clinical need, and in consideration of the availability of blood pressure monitors (BPMs) that are validated for home use in pregnancy.

Providers considering blood pressure self-monitoring should prioritise roll-out to group 1 as a minimum. Trusts and Health Boards can roll out more widely to women in groups 2 and 3 where the woman has an appropriate monitor, or where the Trust or Board can ensure supply.

2.2 Exclusion criteria

Blood pressure self-monitoring should not be offered or continued for women who require admission under local Trust or Board guidelines (e.g. severe hypertension, pre-eclampsia with adverse features).

3. Implementation of home blood pressure monitoring

3.1 Pathway for implementation in a hospital NHS Trust or Board

1. Arrange for the woman to attend an in-person antenatal appointment and check eligibility for self-monitoring of blood pressure. Note that women may already own their own validated monitor (which can be used).

2. Ensure that contact details are up-to-date on hospital electronic system (home, mobile phone number, email).

3. Provide the woman with a semiautomated or automated home blood pressure monitor, validated for use in pregnancy and pre-eclampsia, and an appropriately sized cuff (check upper arm measurement). Label the blood pressure monitor with name of the hospital NHS Trust or Board, and appropriate contact details for the maternity unit.

4. Complete a blood pressure monitor loan form with the woman (Appendix II).

5. Give written instructions on how to take and interpret blood pressure readings (Appendix III). Ask the woman to take her blood pressure twice, at least 1 minute apart and write the second blood pressure down, or send the second reading via a text message or smart phone app.

6. Give written instructions on the expected frequency of blood pressure monitoring, making it clear whether this will be done in place of usual care (e.g. on the morning of a scheduled telephone/ virtual clinic appointment) or in addition to usual care (e.g. once a week or three times a week).

7. Check that the woman understands who to contact with an abnormal reading.

8. Also arrange self-monitoring of urine for proteinuria if required.

9. If you are using an app or text-based system, set this up and check that they are able to log in before leaving the hospital. Ask them to demonstrate sending a blood pressure reading. Make it clear whether or not the readings will be reviewed by a healthcare professional remotely while they are at home. For many maternity units, the usual option would be that blood pressure readings would not be reviewed routinely and that responsibility for acting on high blood

pressure readings sits with the woman.

10. Explain arrangements to the woman for return of the blood pressure monitor, either at the time of coming in for birth, or at a time postnatally if they require postnatal blood pressure monitoring. Options for returning a blood pressure monitor may include handing it back to hospital staff, returning it to a community midwifery hub or posting it in a freepost envelope.

11. Once returned, wipe the blood pressure monitor thoroughly with a cleaning wipe, and check that all components are correct (e.g. cuff, connector, batteries).

12. Consider how to record details of blood pressure monitor loans and associated uptake and outcomes as a service evaluation.

3.2 App-based systems for pregnancy blood pressure monitoring

A range of apps are available that can support the recording of readings taken when self-monitoring and the sharing of these data with clinicians. Currently available apps are (listed in alphabetical order): BPm-Health, Florence, Hampton.

Maternity units should be aware of the difference between a class I and a class II app, and of the implications for use in self-monitoring of blood pressure in pregnancy. A Data Protection Impact Assessment (DPIA) will need to be completed and submitted to your hospital Trust or Health Board before use.

Appendix II. Loan agreement template for hospitals

Loan agreement for blood pressure monitor

Hospital logo

Blood pressure monitor number:

Cuff size:

Declaration:

I accept responsibility for the above equipment and understand I have been asked to monitor my blood pressure through pregnancy (and postnatally) after the baby is born. I will return the blood pressure monitor as requested.

If the blood pressure monitor becomes damaged, lost or stolen, I understand that I must report this information to the Maternity Unit on the below number and that I am not responsible for the cost of replacement or repair.

Name:	
Hospital number:	
Date of birth:	
Signature of agreement to conditions:	
Staff name:	
Staff signature:	
Date:	

Maternity team contact:

Telephone:

Please copy and give one copy to the woman and retain one copy.

Appendix III: Patient information leaflet template for women who are asked to self-monitor blood pressure

How to take your blood pressure at home using an upper arm monitor:

- You will be asked to take your blood pressure reading:
  - On the morning of your clinic appointment if you have normal blood pressure.
  - Once a week if you are at higher risk of getting high blood pressure.
  - One to three times a week if you have high blood pressure.

- Check with your midwife or doctor how often they would like you to monitor your blood pressure.

- Always measure your blood pressure using the same arm (normally the left arm).

- Wear loose clothing with sleeves that roll up easily and do not feel tight when rolled up (you will need to fit the cuff onto your bare arm) or take your arm out of the clothing.

- Sit on a chair with your back supported and both feet flat on the floor. Rest for 5 minutes before beginning to take blood pressure readings.

- Slip the cuff onto your arm so that the air tube points towards your wrist. The yellow line on the cuff should be over the inside of your elbow.

- Adjust the bottom edge of the cuff so that it is about 2 cm above the inside of the elbow joint.

- Tighten the cuff around the arm and secure using the Velcro.

- Rest your arm on a table or across your lap with your hand slightly open and the palm facing upward.

- Once the machine is set up, you have the cuff in the correct position and you are ready to start, press the start button on the front of the machine to take a reading.

- Relax, do not move your arm muscles and do not talk until the measurement is completed.

- Each time you measure your blood pressure you will get two readings:
  - The top number (usually called SYS, short for systolic),
  - The bottom number (usually called DIA, short for diastolic)
  - You may also get the pulse displayed, usually called PUL

- Measure your blood pressure twice, at least 1 minute apart.

- Write down the second blood pressure reading (on your phone, in your maternity notes), or send it by text or smartphone app if you are using one of these systems.

- Act on your blood pressure according to the instructions in the table below.

Level	Blood pressure (/mmHg)	Action
High	SYS 150 or more OR DIA 100 or more	Your blood pressure is high. Sit quietly for 5 minutes then measure it again and note the reading. If your repeated reading is raised, please contact your maternity unit for review today (within 4 hours) and continue to monitor your blood pressure daily. **If your repeated SYS (systolic) reading is 160 or more, make sure that you make contact with a healthcare professional in this time.**
Raised	SYS 140–149 OR DIA 90–99	Your blood pressure is raised. Sit quietly for 5 minutes then measure it again and note the reading. If your repeated reading is raised, please contact your maternity unit within 24 hours and continue to monitor your blood pressure daily.
High Normal	SYS 135–139 OR DIA 85–89	Your blood pressure is normal but moving towards the raised threshold. Sit quietly for 5 minutes then measure it again and note the reading. If your repeat reading is still high end of normal, please monitor your blood pressure daily.
Normal	SYS 110–134 AND DIA 70–84	Your blood pressure is normal. Continue blood pressure monitoring and your current care.
Low	SYS 109 or less AND DIA 69 or less	**If you are not taking blood pressure medication:** Your blood pressure is normal. If you are feeling well this blood pressure does not need any further action. **If you are taking blood pressure medication:** Your blood pressure is low. Repeat once more in 5 minutes. If you repeat reading is still low, contact your maternity unit within 24 hours or within 4 hours if you feel unwell (e.g. dizzy or faint).

Appendix IV: Useful links available for pregnant women with diabetes

What is gestational diabetes?

https://vimeo.com/showcase/6886676 (videos)

https://www.diabetes.org.uk/resources-s3/2017-08/0302A-gestational-diabetes-guide-0915.pdf

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/What_is_Gestational_Diabetes.pdf

https://www.uhb.nhs.uk/Downloads/pdf/PiGestationalDiabetes.pdf

Blood glucose monitoring with glucose meter

https://youtu.be/ldvtZia0EMQ

https://www.youtube.com/watch?v=uRcUB1mosN4&feature=youtu.be (Music only video)

https://agamatrix.co.uk/support/videos/

Mobile apps for home blood glucose monitoring

https://www.nhs.uk/apps-library/mumoactive/

https://www.nhs.uk/apps-library/gdm-health/

https://www.nhs.uk/apps-library/onetouch-reveal/

https://mywaydigitalhealth.co.uk/

Dietary advice for women with gestational diabetes

https://youtu.be/DdmrpStqFvs

https://www.youtube.com/watch?v=TOlTrQvNCKo

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/Healthy_Eating.pdf

Gestational diabetes treatment

https://www.nhs.uk/conditions/gestational-diabetes/treatment/

Type 1 diabetes in pregnancy

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/Sick_Days_Type1.pdf

Continuous glucose monitoring for women with type 1 diabetes

https://abcd.care/dtn/CGM

Avoiding hypoglycaemia in pregnancy

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/How_to_avoid_Hypoglycaemia_in_Pregnancy.pdf

Metformin treatment in pregnancy

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/Metformin_Treatment_in_Pregnancy.pdf

Postnatal care of women with diabetes

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/Post_Natal_Care_for_Gestational_Diabetes.pdf

Breastfeeding your baby and diabetes

https://www.youtube.com/watch?v=gXYNj0pWCk0

http://www.perinatal.nhs.uk/diabetes/projects/leaflets/Diabetes_Breastfeeding.pdf

Preconception advice for women with type 1 or type 2 diabetes

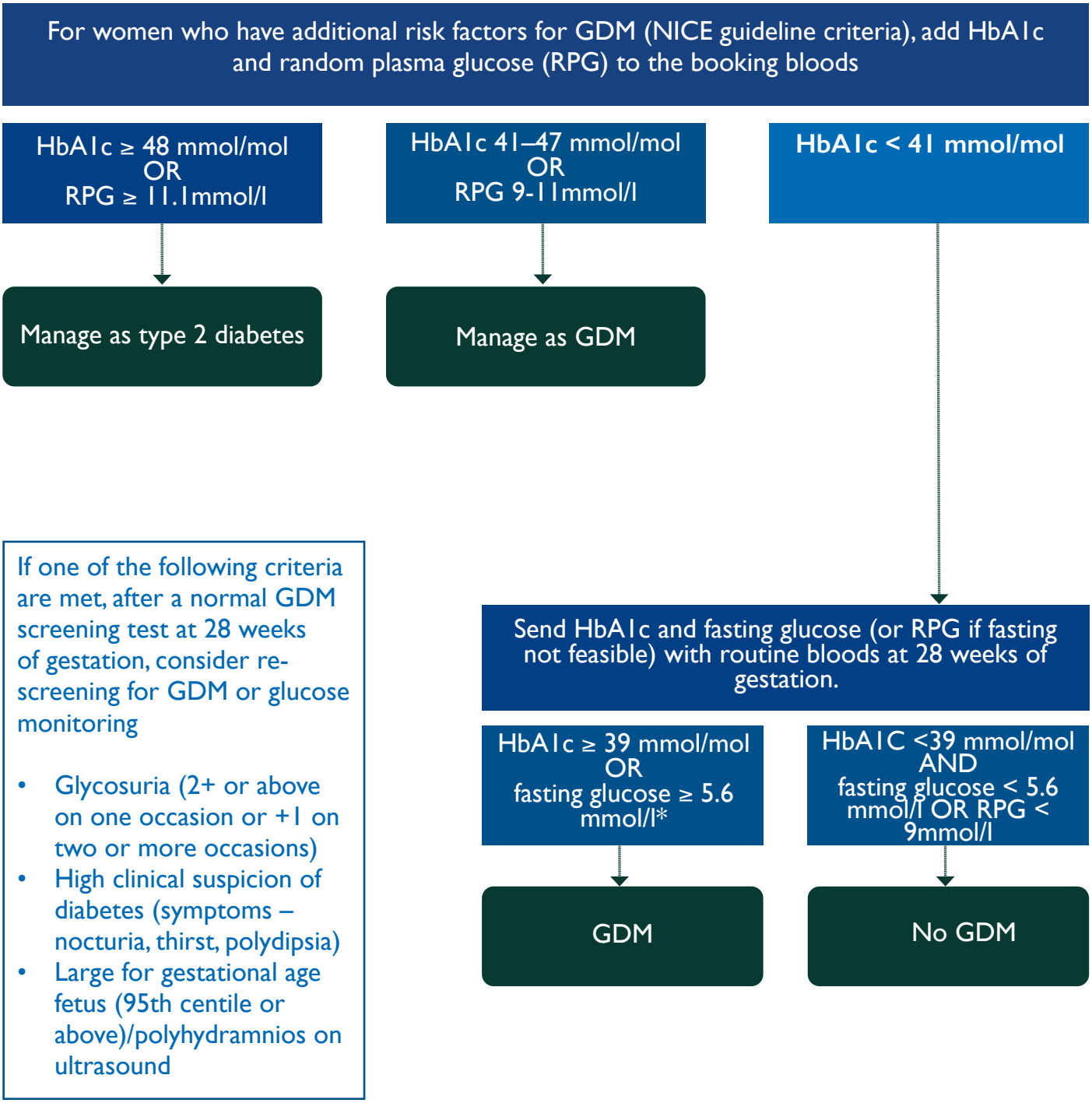
https://www.tommys.org/pregnancy-information/planning-pregnancy/are-you-ready-conceive/planning-pregnancy-type-1-or-2-diabetes

Resources in non-English languages

Australian National Diabetes Services Scheme Initiative – 20 languages

https://www.ndss.com.au/about-diabetes/information-in-your-language/

Appendix V: Screening for women with risk factors for gestational diabetes (GDM) when it is not safe or feasible to offer 2-hour oral glucose tolerance tests (OGTT)



* Based on resources, clinical capacity and population characteristics consider using lower FPG threshold = 5.3 mmol/l to diagnose GDM.

Consider using risk calculators to obtain individualised risk estimates of GDM

Appendix VI: Rationale behind the criteria to diagnose gestational diabetes during the COVID-19 pandemic

1. Background

In normal times, screening for gestational diabetes mellitus (GDM) is offered to women considered to be at high-risk as per NICE criteria using a 2-hour oral glucose tolerance test (OGTT). GDM is diagnosed using the following thresholds: fasting plasma glucose (FPG) 5.6 mmol/l or above or 2-hour postprandial 7.8 mmol/l or above.

However, OGTT requires a prolonged wait in hospital for pregnant women, and it may not be possible to comply with social distancing measures when large numbers of women attend for testing. It also requires resources for OGTT. In pandemic conditions where it may not be either sustainable or safe to perform an OGTT, there is a need for alternate ways to test for GDM, to minimise the risks to the woman from COVID-19 and GDM complications.

2. Key considerations behind recommendations for alternate tests to diagnose GDM in the pandemic

These recommendations are for the duration of the pandemic only, and services should return to usual NICE recommended screening when safe and feasible to do so.

In recommending the alternate thresholds to diagnose GDM, the following has been taken into consideration:

- Any test should be feasible to do in a resource-restricted environment, and should minimise the number of visits and duration of stay in the hospital for the mother.
- Screening tests are chosen for their high sensitivity (i.e. low false-negative rate), but these are often accompanied by low specificity with high false-positive rate. Resources could be strained if high numbers of women access the services with a false diagnosis of GDM.
- Tests with high specificity (i.e. low false-positive rate) are often accompanied by relatively low sensitivity and risk missing the diagnosis of GDM. Safety nets are required to minimise missing the diagnosis in women with GDM, particularly those at high risk of complications.

3. RCOG guidance for diagnosing GDM during the pandemic

No single test can replace OGTT in diagnosing GDM. Hence in this guidance, additional safety-nets have been proposed to maximise the detection of GDM, without unduly overburdening the services. The impact of new criteria on both diagnosis of GDM and other complications has been examined. In the absence of OGTT, the safety-nets proposed include:

- Additional blood tests (HbA1C and random plasma glucose) alongside routine booking bloods.
- Additional blood tests at 28 weeks (HbA1C and fasting or random plasma glucose).

- Clinical suspicion criteria for GDM testing.
- Personalised risk calculator for GDM.
- Real-time evaluation of the impact of alternate tests on services and outcomes.

3.1. Blood tests at booking

At booking HbA1c and random plasma glucose (RPG) are additionally measured.

- HbA1c at 48 mmol/mol or above OR RPG at 11.1mmol/l or above, treat as type 2 diabetes.
- HbA1c at 41–47 mmol/mol or above OR RPG at 9–11 mmol/l, manage as GDM.

The highest risk groups are expected to be detected at booking using the above strategy.

3.2. Blood tests at 28 weeks of gestation

At 28 weeks, HbA1c, fasting plasma glucose (FPG) or RBG (if fasting not available) are done.

- FPG at 5.6 mmol/l or above* OR HbA1c at 39 mmol/mol or above OR RBG at 9 mmol/l or above, treat as GDM.

*Consider FPG at 5.3 mmol/l or above to improve detection rate if resources and capacity allow, as there is a potential for increased number of women accessing services with a diagnosis of GDM.

Clinicians will need to be aware that while the specificity of the above HbA1c and FPG thresholds are high (i.e. low false-positive rate) for diagnosing GDM, the detection rate is low.

In a meta-analysis of 17 studies, a second/third trimester HbA1c cut off of 39 mmol/mol or above has high specificity (0.90, 95% CI 0.79–0.95), with a detection rate of 36% (sensitivity 0.36, 95% CI 0.23–0.52).[37]

Studies to evaluate the impact of the revised criteria to screen for GDM during the pandemic suggested a potential reduction in the proportion of women diagnosed with GDM.[38–40] Of these, two did not have data on booking HbA1c and therefore did not use the RCOG suggested screening pathway.[39,40] One of these was the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) sub-study, based on a universal and not a selectively screened population. In this universal population, 19% of all women would be diagnosed with GDM.[40] The third study did not provide data on clinical outcomes.[38] While it is possible, as suggested above with the low sensitivity associated with the test, in lowered diagnosis of GDM, there is no available evidence on the real time impact of the revised GDM screening criteria on clinical outcomes. Where it is safe and feasible, OGTT should still be the preferred choice for GDM screening. The revised criteria are only for situations where this is not possible.

In the Medical Research Council funded PRiDE cohort (4303 women),** a combined approach of HbA1c at 39 mmol/mol or above OR

- FPG at 5.6 mmol/l or above had a detection rate of 41% (216/521) for GDM using NICE criteria; false-positive rate of 6%.
- FPG at 5.3 mmol/l or above had a detection rate of 45% (234/521) for GDM using NICE criteria; false-positive rate of 8%.
- FPG at 5.1 mmol/l or above increased detection to 51%, but with a 12% false-positive rate, which is not ideal in a pandemic situation.

** findings not published

In the PRiDE cohort, the rates of complications (large for gestational age [LGA], small-for-gestational-age [SGA], stillbirth, preterm birth and caesarean section) in women diagnosed with GDM by various criteria were broadly similar except for SGA (Table 1).

Table 1. Rates of complications in women diagnosed with GDM according to the NICE criteria and the proposed criteria in the PRiDE cohort**

Diagnosis of GDM (No. of women)	LGA n (%)	SGA n (%)	Stillbirth n (%)	Preterm birth n (%)	Caesarean section n (%)
NICE criteria (521)	115(22)	50(10)	1(0.2)	50(10)	88(17)
HbA1c ≥ 39 mmol/mol or FPG ≥ 5.6 mmol/l (439)	107(24)	18(4)	1(0.2)	45(10)	70(16)
HbA1c ≥ 39 mmol/mol or FPG ≥ 5.3 mmol/l (546)	140(26)	23(4)	2(0.4)	54(10)	89(16)

** Findings not published

In a cohort of 2702 women with GDM (IADPSG criteria) in Australia,[41] the rates of adverse outcomes for various fasting thresholds to diagnose GDM is given in Table 2. There were no differences between FPG thresholds of 5.1 and 5.3 mmol/l, with minimal increase in composite adverse outcomes at 5.6 mmol/l. The rates of perinatal and neonatal deaths were increased at 5.6 mmol/l, but the numbers are small (Table 2). However, this sub-analysis of the published data has not been peer reviewed.

Table 2. Rates of maternal and offspring complications for various fasting thresholds used to diagnosed GDM**

Fasting threshold to diagnose GDM mmol/L	Women diagnosed with GDM n (%)	Perinatal death n (%)	Neonatal death n (%)	LGA n (%)	Admission to NICU n (%)	Hypertensive disorders in pregnancy n (%)	Adverse pregnancy outcome* n (%)
≥ 5.1	990 (37)	8 (0.81)	5 (0.51)	145(15)	298 (30)	88 (9)	314 (32)
≥ 5.3	766 (28)	7 (0.91)	4 (0.52)	116 (15)	228 (30)	71 (9)	252 (33)
≥ 5.6	245 (9)	4 (1.63)	3 (1.22)	49 (20)	85 (35)	25 (10)	95 (39)

*Adverse Pregnancy Outcome Composite consisting of LGA > 90th percentile, hypertensive disorders of pregnancy, neonatal hypoglycaemia requiring IV therapy, shoulder dystocia, neonatal fracture, neonatal nerve palsy or fetal or neonatal death; NICU neonatal intensive care unit ** sub-analysis of the published data has not been peer reviewed

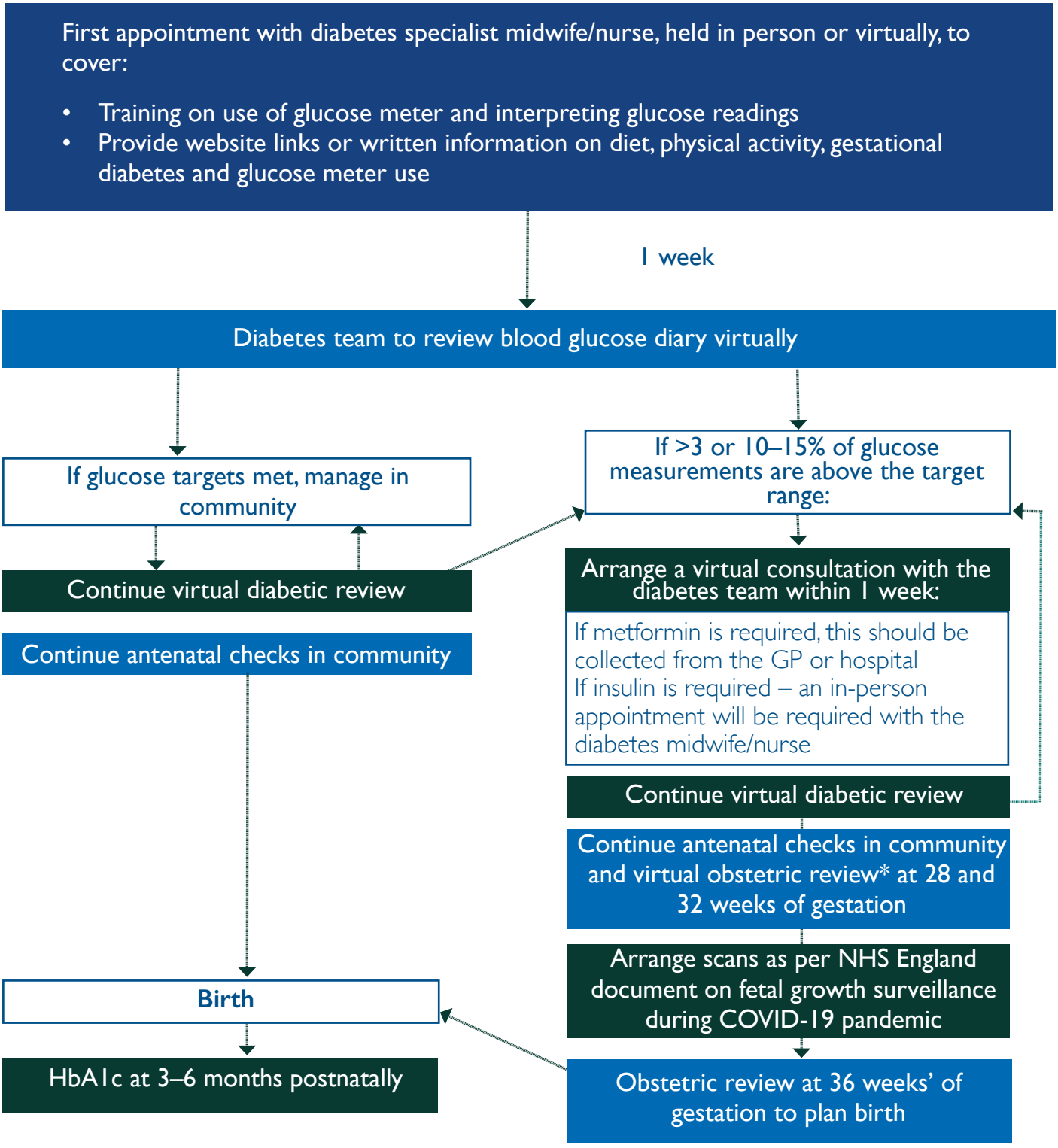
3.3. Clinical suspicion of GDM

Women with glycosuria (2+ or above on one occasion or +1 on two or more occasions), symptoms (nocturia, thirst, polydipsia), or large for gestational age (95th centile or above)/polyhydramnios on ultrasound should be tested for GDM. If there is a strong clinical suspicion despite negative blood tests for GDM, consider additionally using the risk calculator (section 3.4) or commence glucose monitoring.

3.4. Risk calculator

Healthcare professionals are recommended to use the **GDM risk calculator** to determine the personalised risk of GDM for the woman. The externally validated GDM risk model uses routine information (age, height, weight, ethnicity, previous history of GDM, family history of diabetes) collected in the first trimester and predicts GDM risk with good discrimination (C-statistic 0.77, 95% CI 0.73–0.81) and calibration (slope 1.1). It also has good predictive accuracy in nulliparous women (C-statistic 0.75, 95% CI 0.68–0.82). Use of the risk calculator can help to improve the detection rate of GDM.

Appendix VII: Antenatal care of pregnant women with gestational diabetes



* consider in person review if blood sugars not well controlled or additional risk factors present

Appendix VIII: Summary of previous updates

Version	Date	Summary of changes
1.1	3.4.20	**3.1:** Change from recommendation to screen for pre-eclampsia using a PlGF- test to PlGF-based testing, in response to feedback from unit who currently use sFlt-1:PlGF ratio.
1.1	3.4.20	**3.2:** Change to the fasting plasma glucose threshold when screening for GDM. Units are now advised to use a threshold of 5.6, but to consider a threshold of 5.3 if they have capacity to do so. Supportive guidance available in appendix 4.
1.1	3.4.20	**Authors:** Helen Murphy added as section author for guidance on diabetes in pregnancy.
1.1	3.4.20	**Appendix 3:** Modified with further details on the rationale for additional tests to diagnose GDM, if oral glucose tolerance test is not performed.
2	9.4.20	**Section 2:** Clarification that women attending maternal medicine clinics should continue to receive midwifery-led care, as per the RCOG guidance on antenatal and postnatal care during the COVID-19 pandemic, when they are not being seen by their maternal medicine team.
2	9.4.20	**3.4 and 3.9** Addition of links to NICE rapid guidance on the care of individuals with severe asthma and rheumatological autoimmune conditions.
2	9.4.20	**3.5.3:** Further advice on shielding women with homozygous sickle cell disease who must attend hospital.
2	9.4.20	**3.5.4:** Clarity that assessment of risk for venous thromboembolism should continue to follow existing guidance.
2	9.4.20	**3.5.5:** Guidance for maternal medicine teams on women with inherited bleeding disorders.
2	9.4.20	**3.8.4:** Recommendations regarding the mental wellbeing of women with hyperemesis gravidarum.
2	9.4.20	**3.10.1** Rephrasing of advice regarding risks of breastfeeding for women with HIV.
2	9.4.20	**3.12:** Section changed to recommendations on women with cancer in pregnancy. New advice inserted.
2	9.4.20	**3.13** Recommendations on pre-conception care moved to section 3.13.This includes a new statement on the provision of pre-conception care which cannot be delayed.
2.1	24.4.20	**3.2.1** Change to the recommendation regarding retinal screening in pregnancy for women with pre-existing diabetes following notification from Public Health England that they have sent a letter to all public health commissioners recommending that all screening continue, but with prioritisation for those at highest risk.
2.1	24.4.20	**Appendix 1** Addition of links for NHS or MHRA approved apps for home glucose monitoring.
2.2	13.5.20	**1:** New evidence from UKOSS included
2.2	13.5.20	**3.2, 3.5 and 3.5.3:** Specific advice relevant to women from BAME backgrounds added

2.2	13.5.20	**3.8.3:** Recommendations for the management of women with bile acids within the normal range and bile acids <100umol/L have been changed, suggesting that additional monitoring could be conducted in both cases in line with planned face-to-face antenatal appointments.
2.3	26.6.20	**1:** UKOSS reference updated to the paper published in *The BMJ*.
2.3	26.6.20	**3:** Removed paragraph that summarised UK Government shielding advice and signposted to UK Government website.
2.3	26.6.20	**3.8.3:** Specified that adaptations are in response to the meta-analysis published in *The Lancet* (in place of reference to Green-top Guideline in development). No change made to advice.
2.4	10.7.20	**0:** Added a note on the implementation of this guidance to clarify that the guidance was intended for the peak of the pandemic and that services should return to normal practice as soon as the local risk of transmission and prevalence allows.
2.4	10.7.20	**3.2.2:** Added advice that suggested modification to GDM screening applies to the peak of the pandemic and that services should return to pre-existing screening strategies as soon as the local risk of transmission and prevalence allows.
2.4	10.7.20	**3.8.4:** Clarification that standard therapies should continue to be offered to women with hyperemesis gravidarum, including consideration of corticosteroids where the benefits are thought to outweigh the risks.

DISCLAIMER: The Royal College of Obstetricians and Gynaecologists (RCOG) has produced this guidance as an aid to good clinical practice and clinical decision-making. This guidance is based on the best evidence available at the time of writing, and the guidance will be kept under regular review as new evidence emerges. This guidance is not intended to replace clinical diagnostics, procedures or treatment plans made by a clinician or other healthcare professional and RCOG accepts no liability for the use of its guidance in a clinical setting. Please be aware that the evidence base for COVID-19 and its impact on pregnancy and related healthcare services is developing rapidly and the latest data or best practice may not yet be incorporated into the current version of this document. RCOG recommends that any departures from local clinical protocols or guidelines should be fully documented in the patient's case notes at the time the relevant decision is taken.

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Royal College of Obstetricians & Gynaecologists

Royal College of Obstetricians and Gynaecologists, 10-18 Union Street, London, SE1 1SZ
T: +44 (0) 20 7772 6200 E: covid-19@rcog.org.uk W: rcog.org.uk Registered Charity No. 213280