COVID-19 infection
Guidance for Maternity Services

Institute of Obstetricians and Gynaecologists RCPI

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Version 4.0 5 May 2020
1. Executive Summary

This guidance document outlines considerations for care for pregnant women and their infants during the COVID-19 pandemic. It provides advice for maternity units around the provision of safe care to women and infants with suspected / confirmed COVID-19. It is a resource for healthcare staff working in the maternity services, sets out a framework for managing the impact on maternity services and provides principles to help units develop their own response plans. Information in this document has been prepared using a multidisciplinary approach with reference to the best information and evidence available.

The novel coronavirus infection (COVID-19), also termed SARS-CoV-2, which emerged in December 2019 has become a global public health emergency and was declared a pandemic by the World Health Organisation on the 11th March 2020. Symptoms of COVID-19 are non-specific, although most typically involve cough, shortness of breath and fever, and the disease presentation can range from no symptoms (asymptomatic) to severe pneumonia and death. Most people infected with COVID-19 virus have mild disease and recover. Approximately 80% of those infected have mild to moderate disease, 13-14% have severe disease and around 6% develop critical disease. Individuals at highest risk for severe disease and death include people aged over 60 years and those with underlying conditions such as hypertension, diabetes and cardiovascular disease; mortality rates increase with age and disease in children seems to be both rare and mild.

Pregnancy is a physiological state that predisposes women to complications of viral infection, and therefore pregnant women have been predicted to be at greater risk for serious illness, morbidity or mortality due to COVID-19 compared to the general population. From the literature to date, pregnant women do not appear more likely to contract COVID-19 infection than the general population. It is still unclear whether pregnant women with COVID-19 will be shown to experience more severe disease, when more evidence and information becomes available. There is no data on first trimester infection nor on implications for ongoing pregnancy. However, the growing numbers of published case reports and case series reassuringly suggest that pregnant women are no more likely to experience severe or critical illness than non-pregnant women. There are now some reports of maternal deaths but most have not been published in the scientific literature. To date, viral RNA has not been detected in amniotic fluid, vaginal secretions or breast milk. It is currently considered possible, but not proven, that SARS-CoV-2 can be transmitted vertically, from mother to baby. The proportion of pregnancies affected and the significance for the child are yet to be determined.

Women should be advised to attend routine antenatal care unless they meet current self-isolation guidance with symptoms of new continuous cough or fever. The women should attend clinic on their own and are asked to only come at their designated time to avoid too many people in waiting areas. Remote consulting may be useful. Units should appoint a group of clinicians to co-ordinate care for women forced to miss appointments due to self-isolation, and should have a system to flag women who have missed serial appointments. It is important that support for women and families is strengthened as far as possible. Isolation, bereavement, financial difficulties, insecurity and inability to access support systems are all widely recognised risk factors for mental ill-health. The coronavirus epidemic increases the risk of perinatal anxiety and depression, as well as domestic violence.

A senior obstetrician with a specialist interest in maternal medicine should assess all new referrals of pregnant women with medical disorders. Some will need individualised care plans and to attend in person for clinics. Consideration to the specific topics: hypertension, pre-eclampsia, pre-existing diabetes, gestational diabetes (GDM) cardiac disease, haematology/venous thromboembolism (VTE) are provided in a short outline in the document. Pregnant women with some medical co-morbidities may be considered more vulnerable to COVID-19 infection.
All women presenting at the maternity emergency department (ED) or early pregnancy clinic (EPC) should be triaged and asked about symptoms of COVID-19 infection as well as pertinent risk factors. Women who become unwell or who are experiencing complications in pregnancy should still be encouraged to present for review at the maternity ED.

Early pregnancy care may need reorganisation to reduce the numbers of scan appointments, and management of early pregnancy loss should consider greater recourse to conservation and medical options. Women with early pregnancy complications should still be referred to appropriate counselling services and to reliable, accurate online sources of information.

Ultrasound is an essential part of obstetric care, but exposes both patient and caregiver to high risks, given the impossibility of keeping the recommended distance between them during the ultrasound scan. It is therefore essential to take all possible precautions when undertaking routine ultrasound activity, use of personal protective equipment (PPE) is recommended, and providers should reduce the contact time for scans. All referrals to Fetal Medicine Services should be discussed with a Fetal Medicine consultant prior to referral. For some women, delaying the appointment until after the period of self-isolation or until recovered from the illness, may be clinically acceptable. In cases where urgent review or intervention cannot be delayed, women should be seen with the appropriate PPE used by clinicians.

Before entering the maternity unit, pregnant women should be triaged at entry to the hospital or department (or clinical area). All those entering the maternity unit/services should be asked if there has been recent onset of fever or chills and signs or symptoms of respiratory tract infection, which includes cough or shortness of breath. Clinical judgement should be employed when assessing these criteria, as pregnant women may present with atypical symptoms. Possible COVID-19 and non COVID-19 patients should be separated into two parallel streams for subsequent assessment and clinical review throughout the hospital/unit. Maternity units should consider contacting women the day before elective admission for Caesarean section or induction of labour, in order to triage and ask about symptoms. If these meet the case definition, elective admission and management can be better planned.

If the pregnant woman is well and does not need hospital admission: then it is recommended the woman returns home and contacts her GP to arrange testing or can undertake local maternity testing if available. She should be provided with appropriate information and referred to helpful sources, and given contact details for the hospital. However, if the woman has an additional co-morbidity or develops an obstetric condition that is likely to require further assessment in the maternity service e.g. obstetric cholestasis, gestational hypertension, fetal growth restriction, or is >34 weeks’ gestation then testing should be prioritised and arranged through local maternity pathways.

Chest imaging, especially CT scan, has proven essential for evaluation of the clinical condition of adults with COVID-19 infection. In a pregnant woman with suspected COVID-19 infection, a chest CT scan may still be considered as a primary tool for the detection of COVID-19 in epidemic areas, and used as available. Informed consent should be acquired (with shared decision-making) and a radiation shield be applied over the gravid uterus.

In the setting of a mild infection, management similar to that for a patient recovering from influenza is reasonable. Given how little is known about this infection, a detailed mid-trimester anomaly ultrasound examination should be provided following first-trimester maternal infection. For those experiencing illness later in pregnancy, and with an ongoing pregnancy, it is reasonable to consider regular sonographic assessment of fetal growth in the third trimester.

VTE risk assessment should be carried out on all women who are admitted with COVID19 infection. VTE prophylaxis with low molecular weight heparin is recommended unless within 12 hours of birth. The Irish Maternity Early Warning System (IMEWS) should be used for the hospital care of a woman with a confirmed clinical pregnancy and for up to 42 days in the postnatal period irrespective of age or reason for presentation to hospital. The subsequent
frequency of observations should be determined by the baseline recordings and the woman’s individual clinical circumstances.

There is no evidence to suggest that antenatal corticosteroids for fetal lung maturation cause any harm in the context of COVID-19, except perhaps where the pregnant woman has a critical illness in which case a multidisciplinary discussion needs to determine their relative benefit. Steroids should therefore be given to mothers anticipating preterm delivery where indicated and urgent delivery should not be delayed for their administration.

Where a pregnant or postpartum woman is critically ill, a multi-disciplinary discussion planning meeting should be arranged as soon as possible following admission, to consider key priorities for medical care, the most appropriate location of care, and concerns amongst the team regarding special considerations in pregnancy, particularly the condition of the fetus. These considerations, including where the pregnant woman requires intensive care (ICU) unit admission, are set out in the document.

Timing of delivery, in most cases, should not be dictated by maternal COVID-19 infection. For women infected early in pregnancy who recover, no alteration to the usual timing of delivery is necessary. For women infected in the third trimester who recover, it is reasonable to attempt to postpone delivery (if no other medical indications arise) either until a negative testing result is obtained or quarantine status is lifted in an attempt to avoid transmission to the neonate or others.

It is expected that as a minimum, pregnant women should have one birthing partner with them in labour, unless this partner is symptomatic or unwell, irrespective of the woman’s COVID-19 status. In situations where the woman has or is suspected to have COVID-19 infection there may be situations where regrettably this is not possible relating to PPE availability, workforce gaps or unit configuration. Local policies may also apply for the partner to wear PPE, and to stay in the room for the duration of the labour or delivery. Hospitals/units need to provide accessible information regarding visiting and partners.

In general, COVID-19 infection itself is not an indication for delivery, unless there is a need to improve maternal oxygenation in critical illness. For suspected, probable and confirmed cases of COVID-19 infection, delivery should be conducted in an isolation room. A senior obstetrician should be present. Both regional anaesthesia and general anaesthesia can be considered, depending on the clinical condition of the pregnant woman and after consultation with the senior obstetric anaesthetist.

Continuous electronic fetal monitoring is recommended as fetal distress has been reported in pregnant women with COVID-19 infection. It is best to avoid fetal scalp electrode monitoring and fetal blood sampling (consistent with recommendations for other maternal infections).

Plans for emergency delivery (instrumental or operative) should be appropriately communicated in a timely manner with all relevant senior personnel on the delivery suite. Local plans needs to be in place about the number of staff involved in these scenarios, the use of PPE, as well as safe transfer from delivery suite to operating theatres if this becomes necessary. General anaesthesia should be avoided unless absolutely necessary for standard indications. Donning PPE is mandatory and time consuming and this will impact on decision to delivery time for category 1 caesarean delivery, no matter what the anaesthetic technique used. Women and their families should be told about this delay.

Consideration of the safety of all medicinal products used during pregnancy, including for the management of COVID-19 infection, is essential. Treatment should only be initiated with multidisciplinary input from relevant Specialities and Pharmacy advice should be sought on this as well as on available products, choice of agent, and potential drug-drug interactions. A summary of the information available for medications use in pregnancy and lactation is provided, and is designed to complement the HSE national guidance on their use.
Diagnosis, investigation and management of pregnancy loss should continue as much as possible in accordance with the National Standards for Bereavement Care following Pregnancy Loss and Perinatal Death.

Planned homebirths continue as a choice for healthy normal risk women who meet the eligibility criteria for HSE Homebirth services or those criteria identified by the individual maternity hospitals with community midwifery services. Hospital birth is recommended for those women who are COVID-19 positive close to term or for whom delivery is recommended during the illness.

The neonatal team should be informed of plans to deliver the baby of a woman affected by moderate to severe COVID-19 infection, as far in advance as possible and should also be given sufficient notice at the time of birth. Asymptomatic well babies should not be admitted to the neonatal unit (NNU). Delayed cord clamping can still be practiced at delivery, given no other contraindications.

Babies of COVID-19 positive mothers who need admission to the NNU for any reason should be isolated, and managed in their own isolette in a designated isolation area, with dedicated staffing. However, well term/near-term babies, not otherwise requiring neonatal unit care, should stay with their mother, if at all possible. If the mother is severely or critically ill, separation may then be necessary and will be reviewed on an individual case basis.

In light of current evidence, the benefits of breastfeeding outweigh any potential risks of transmission of the virus through breastmilk. If the woman is asymptomatic or mildly affected, breastfeeding and co-location can be considered by the mother in coordination with healthcare providers. Since the main concern is that the virus may be transmitted by respiratory droplets rather than breastmilk, breastfeeding mothers should ensure to wash their hands and wear a three-ply surgical face mask before touching the baby.

There is currently no clinical indication to test any well baby born to a COVID-19 positive mother. Newborns may not show all the features of an influenza-like illness, particularly a fever, so clinicians should have a high index of suspicion in all babies, especially those admitted to the NNU and monitor for signs of respiratory illness during the admission. In the absence of evidence to the contrary, it is reasonable to treat the baby’s respiratory illness in the same way as if they were not potentially exposed to COVID-19.

Neonatal transfers will still need to occur but should be limited to a minimum, and as per network escalation policies. Exposure to COVID-19 in itself is not a reason to transfer.

Current COVID-19 related autopsy protocols refer to the infected or potentially infected patient and are applicable for COVID-19 related maternal deaths. They do not deal with the specific scenario where an autopsy is being considered on the miscarried or stillborn infant of an infected mother. In this scenario the risk to hospital staff of infection is poorly understood but at a minimum, apart from considerations around reported instances of possible vertical transmission, there is a risk of infection. Further, during the current COVID-19 pandemic, autopsy practice involves making a risk assessment on a case by case basis. The taking and sending of fresh samples for purposes such as cytogenetic analysis may pose an unwarranted risk of infection at this time and should be discussed with the relevant laboratory. All perinatal post mortem examinations will now necessarily involve COVID-19 swabbing of the mother or infant or both. Each institution should have an agreed protocol for same to ensure that bereavement care is not unnecessarily compromised.

A designated member of the management team should take responsibility for PPE and senior management agree a team to manage PPE stock within the hospital/unit. Training for all staff in the use of PPE should be provided. Information leaflets should be placed in public areas in the hospital to raise awareness of PPE use.
Pregnant healthcare workers are specifically impacted by the nature of their professional activities and exposure. This risk applies particularly, but is not limited to, those in nursing and midwifery, or those providing medical or ancillary care, to known infected patients. Pregnant healthcare workers should therefore be allocated to patients, and duties, that have reduced exposure to patients with, or suspected to have, COVID-19 infection.

Those pregnant healthcare staff who also have underlying medical conditions should discuss with their treating obstetrician as redeployment or working from home may be further advised.

Education and training of staff is vital to ensure staff safety and delivery and continuation of a safe, effective service. Employers have an important role in communication with staff, providing clear policies on pay, sick leave and self-isolation.

Healthcare staff are at increased risk of stress and mental health problems when dealing with challenges of the COVID-19 pandemic. Self-care is a priority. Healthcare managers need to proactively take steps to protect the wellbeing of their staff.

All units should report and provide information of all pregnant women and newborns who have been tested for COVID-19 to the National Perinatal Epidemiology Centre (NPEC) register. A record of COVID-19 positive cases should be maintained as the NPEC intend to complete an in-depth national audit later in the year. All units should maintain data entry practices that continue to provide up to date, quality data.
2 Version Control

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3 Aims of the guidance document

- To outline considerations for care for pregnant women and their infants during the COVID-19 pandemic
- To advise maternity units around the provision of safe care to women and infants with suspected / confirmed COVID-19 infection
- To support healthcare staff working in the maternity services
- To set out a framework for managing the impact on maternity services
- To provide principles to help units develop their own response plans

This document is intended as a guide and provided for information purposes only. The information has been prepared using a multidisciplinary approach with reference to the best information and evidence available at the time of preparation. We acknowledge using detail from recent guidance from the Royal College of Obstetricians and Gynaecologists, Royal College of Paediatrics and Child Health, the International Society of Ultrasound in Obstetrics and Gynaecology, the Society for Maternal and Fetal Medicine, and Queensland Health. The document can therefore be considered in conjunction with other relevant advice from these professional bodies and international organisations (Section 17: Useful links).

The guidance document is not a substitute for clinical judgement, knowledge and expertise, or medical advice. Variation from the guidance document, taking into account individual circumstances, may be appropriate. As this is an evolving situation this guidance is subject to ongoing review and will be updated as further information and evidence becomes available.
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5 Endorsements

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Executive Council of the Institute of Obstetricians and Gynaecologists of Ireland (IOG)
Office of the Nursing and Midwifery Services Director (ONMSD)
6 Background

The novel coronavirus infection (COVID-19), also termed SARS-CoV-2, is a global public health emergency. Since the first case of COVID-19 pneumonia was reported in Wuhan, Hubei Province, China, in December 2019 (1), the infection has spread rapidly to the rest of China and beyond (2,3). The disease is now referred to as coronavirus disease 2019 (COVID-19), and the causative virus is called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It is a new strain of coronavirus that has not been previously identified in humans. On March 11, 2020, the World Health Organisation (WHO) declared the COVID-19 outbreak a pandemic.

Virology

Coronaviruses are enveloped positive stranded RNA viruses in the order of *Nidovirales* and were identified as human pathogens in the mid-1960s. To date, seven coronaviruses have been shown to infect humans. Epithelial cells in the respiratory and gastrointestinal tract are the viruses’ primary target cells. Due to these characteristics, viral shedding occurs via these systems and transmission can occur through different routes: fomites, airborne or faecal-oral (4, 5).

Coronavirus infections include the common cold (HCoV 229E, NL63, OC43 and HKU1), Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). The epidemics of the two β-coronaviruses, severe acute respiratory syndrome coronavirus (SARS-CoV), which emerged in 2003, and Middle East respiratory syndrome coronavirus (MERS-CoV), which emerged in 2012, have caused more than 10,000 cumulative cases in the past two decades, with mortality rates of 10% for SARS-CoV and 37% for MERS-CoV (3, 6,7, 8, 9). COVID-19 belongs to the same β-coronavirus subgroup and it has genome similarity of about 80% and 50% with SARS-CoV and MERS-CoV, respectively (10).

Transmission

Human coronaviruses most commonly spread from an infected person to others through a variety of means, such as airborne droplets from coughing and sneezing; close personal contact, including touching and shaking hands; and touching one’s nose, mouth, or eyes before washing one’s hands. There is some evidence suggesting that transmission can occur from an infected person with no symptoms (4), although this may be because some people with COVID-19 experience only mild symptoms with the disease and are in the early stage of infection. Studies to date however suggest that the virus that causes COVID-19 is mainly transmitted through contact with respiratory droplets rather than through the air (European Centre for Disease Prevention and Control (ECDC) and the World Health Organisation (WHO)).

The incubation period of coronaviruses (i.e. the time between exposure to the virus and onset of symptoms) ranges from 2–14 days (4). SARS-CoV had an incubation period between 3–10 days and MERS-CoV up to 14 days (8, 9). The incubation period for COVID-19 is currently estimated at between two and 14 days (median, 5 days). The WHO have estimated a high R0 (reproduction number) of 2–2.5 but a recent literature review estimated the average R0 to be 3.28 (11).

Clinical features and case definition

Clinical presentations of COVID-19 range from no symptoms to severe pneumonia, and severe disease can lead to death. Huang et al. first reported a cohort of 41 patients with COVID-19 pneumonia, and described the epidemiological, clinical, laboratory and radiological characteristics, as well as treatment and clinical outcome of the patients (1). Subsequent studies with larger sample sizes have shown similar findings. The most common symptoms reported are fever (43.8% of cases on admission and 88.7% during hospitalisation) and
cough (67.8%) (12). All hospitalised cases are reported to have abnormalities on radiological imaging of the chest.

More severe symptoms such as pneumonia with marked hypoxia are widely described with COVID-19 in older people, the immunosuppressed and those with long-term conditions such as diabetes, cancer and chronic lung disease (12, 13). The median duration between onset of symptoms and intensive care admission has been 9 to 10 days, suggesting a gradual deterioration in the majority of cases (13).

Those with hypertension and cardiovascular disease (CVD) also seem more likely to develop severe symptoms if infected with SARS-CoV-2, and patients with CVD account for a high proportion of the deaths from COVID-19 (14), with around 7% of those infected suffering a myocardial injury.

Case definitions have been set out by the WHO, ECDC and the Irish Health Protection Surveillance Centre (HSPC). The latter’s most recent definition (28th April 2020) now includes the following clinical criteria (15):

A patient with acute respiratory infection (sudden onset of at least one of the following: cough, fever, shortness of breath) AND with no other aetiology that fully explains the clinical presentation
OR
A patient with any acute respiratory illness AND having been in close contact with a confirmed or probable COVID-19 case in the last 14 days prior to symptom onset;
OR
A patient with severe acute respiratory infection (fever and at least one sign/symptom of respiratory disease (e.g. cough, fever, shortness of breath)) AND requiring hospitalisation (SARI) AND with no other aetiology that fully explains the clinical presentation.

Clinical judgement should be applied in application of these criteria to determine who requires testing.

Overall case fatality ratio estimates for COVID-19 (including asymptomatic and symptomatic infections) appear to be in the range of 1-2% (0.5-10%), although these estimates differ around the world according to the testing regimes used and the population demographics, and they continue to change in the literature (16, 17).

Since 31 December 2019 and as of 4 May 2020, 3,467,321 cases of COVID-19 (in accordance with the applied case definitions and testing strategies in affected countries) have been reported, including 246,979 deaths across over 215 countries (18).

In EU/EEA countries with available data, 30% of diagnosed COVID-19 cases were hospitalised and 4% had severe illness. Hospitalisation rates were higher for those aged 60 years and above (18) and men were more frequent among hospitalised cases and deaths (1, 12, 18).

In Ireland as of 3 May 2020 21, 772 cases had been reported and 1,319 deaths had been confirmed by the HSPC (19).
https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/casesinireland/

Pregnancy

Pregnancy is a physiological state that predisposes women to complications of viral infection. Due to the physiological changes in their immune and cardiopulmonary systems, pregnant women are more likely to develop severe illness after infection with respiratory viruses (3, 20). This tendency may be more obvious towards the end of pregnancy.
In 2009, pregnant women accounted for 1% of patients infected with influenza A (the subtype H1N1) virus, but they accounted for 5% of all H1N1-related deaths (21). In addition, SARS-CoV and MERS-CoV are both known to be responsible for severe complications during pregnancy, including the need for admission to an intensive care unit (ICU), mechanical ventilation, renal failure and death (7, 22). The case fatality rate of SARS-CoV infection among pregnant women is up to 25% in some series (7) but was 15% for all reported cases in the literature (22). Pregnancy outcomes also varied by trimester, with a high rate of pregnancy loss and preterm delivery reported (3, 7, 17, 22). Ongoing pregnancies were more likely to be complicated by fetal growth restriction (2/3 cases) and other placental-mediated complications (22). No vertical transmission was reported for cases of SARS-CoV or MERS-CoV in pregnancies delivered by Caesarean section or vaginal delivery (22).

Although data are limited, there is no evidence from other severe coronavirus infections (SARS-CoV or MERS-CoV) that pregnant women are more susceptible per se to infection with coronaviruses (3, 17, 20). There are no data to inform whether pregnancy increases susceptibility to COVID-19 infection (22).

From the experience with SARS-CoV and MERS-CoV it is reasonable to predict that pregnant women might be at greater risk for severe illness, morbidity, or mortality following COVID-19 infection compared with the general population (3, 20, 22, 23). It also seems reasonable to speculate that pregnant women with co-morbidities such as diabetes or hypertension, or other cardiovascular disease, might be more at risk.

A brief summary of the published literature – primary case reports and case series – is included in Appendix 1 at the end of the guidance document.

Maternal outcomes

Pregnant women do not appear more likely to contract COVID-19 infection than the general population (3, 20, 22). It is still unclear whether pregnant women with COVID-19 will be shown to experience more severe disease, when more evidence and information becomes available. However, the growing numbers of published case reports and case series reassuringly suggest that pregnant women are no more likely to experience severe or critical illness than non-pregnant women.

To date, over 350 women affected by COVID-19 infection in pregnancy have been reported or discussed in the scientific literature, with others being reported to international registries.

In cases in which maternal morbidity were reported from China (22,24), two women required intensive care unit (ICU) admission and mechanical ventilation (25, 26) and one developed multi-organ dysfunction and was still on extracorporeal membrane oxygenation (ECMO) when her case was reported (26).

In a recent case series from New York and the first published from outside China, 2 women became acutely unwell peri/post-partum and required ICU admission with one needing mechanical ventilation; both recovered (27). In a larger combined series from 2 New York hospitals (which included original cases), the authors report 37 (87%) women with mild disease, four (9.3%) exhibited severe disease, and two (4.7%) developed critical disease (28). These percentages are similar to those described for non-pregnant adults with COVID-19 infections: about 80% mild, 15% severe, and 5% critical disease. An unrelated New York series reported that 2 of 7 women developed critical disease and both were diagnosed with a cardiomyopathy. It is unclear if this is a COVID-19 complication, which is possible given rates of cardiomyopathy reported in non-pregnant COVID-19 positive ICU patients, or a manifestation of multi-organ failure and critical illness (29).

An initial report from Lombardy, one of the regions worst affected to date by the COVID-19 pandemic, comments on 19/42 women with COVID-19 pneumonia, of whom 7 had severe disease, and 4 were admitted to a critical care unit. All apparently recovered (30, 31).
The UK’s INARC report of 1st May includes details of 7,542 admissions to critical care with COVID-19 infection; of these 20 female patients were currently pregnant and 27 are reported to have been recently pregnant (31). 21 pregnant / recently pregnant women were among those receiving advanced respiratory support (which includes CPAP, invasive ventilation or ECMO). Specific outcomes for these women are not reported (32).

A report from the International Severe Acute Respiratory and emerging Infections Consortium (ISARIC) included 16,749 hospitalised UK patients with COVID-19. This represents 14.7% of people who have tested positive for COVID-19 in the UK, most of whom have not required hospital admission, and 28% of admissions with COVID-19. 55/963 (6%) of the women of reproductive age were pregnant. This is similar to the authors’ estimated proportion of pregnant women in the community. Pregnancy was not associated with mortality (33).

The report of the WHO-China Joint Mission on Coronavirus Disease 2019 states that “as opposed to Influenza A (H1N1), pregnant women do not appear to be at higher risk of severe disease. In an investigation of 147 pregnant women (64 confirmed, 82 suspected and 1 asymptomatic), 8% had severe disease and 1% were critical” (34).

A regional series of women treated between December 8, 2019 and March 20, 2020, was extracted by the National Health Commission of China, which stores the medical records of all 50 designated hospitals in Wuhan city. Nineteen of the 50 hospitals had reported cases. No mothers died, and apart from 3 spontaneous abortions, 2 ectopic pregnancies, and 4 induced abortions, no babies died (35).

The Netherlands COVID registry, one of the first to report online, as of 1st May includes 138 pregnant women with proven COVID-19 infection, of whom 81 have an ongoing pregnancy. 6 women were admitted to ICU, where one still remains on mechanical ventilation and no mother or baby died (36).

The CDC COVID response team have reported outcomes among COVID-19 patients of all ages in the US from February 12 to March 28 2020. This report includes 143 pregnant women (2% of all reports); 31 were known to be hospitalised and 4 were admitted to ICU (37).

Very little is known about the natural history of pregnancy after a pregnant woman recovers from COVID-19 infection (20, 22, 23), however reports to date include a large number of ongoing pregnancies (28, 29, 31, 36, 33, 38), so this information should eventually be forthcoming.

There is no evidence to suggest that corticosteroids for fetal lung maturation cause any harm in the context of COVID-19 infection in pregnancy, except perhaps where the pregnant woman has a critical illness as there is some evidence in critically-ill adults that steroids worsen the course of the disease. In these situations, a multidisciplinary discussion needs to determine the relative value of antenatal corticosteroids, versus the more likely benefit of immediate delivery.

There is currently no evidence from the published literature to favour one mode of birth over another. Almost all reported cases in the literature from China feature pregnancies delivered by Caesarean section. With the newer US and Italian case series, there are increasing reports of uncomplicated vaginal deliveries (28, 29, 30, 31). At present, there are no recorded cases of vaginal secretions being tested positive for COVID-19 and some studies have specifically focussed on this question (39, 40).

Given the rate of fetal compromise reported in the original Chinese case series (41, 42), the current recommendation is for continuous electronic fetal monitoring in labour.

The first maternal death from COVID-19 infection in the published literature originated from Iran (43). Since then from the scientific papers, it is reported that 16/367 (4%) of women died – these reports emanate from Brazil, Mexico and Iran (44, 45). Of the larger case series
now published from New York, Wuhan, the Netherlands and Lombardy, there are no maternal deaths reported (27, 28, 31, 35, 36), although a number of women were critically ill. While there are reports of maternal deaths in the international news media (13 to date), these are not all verified in the medical literature, and COVID-19 is not proven as the cause of death in all of these cases (46).

Mortality for non-pregnant people, age 16-49 years, with COVID-19, who needed intensive care is 24% (UK’s ICNARC audits; (32)). If pregnant women on intensive care had the same mortality, it can be speculated that this would correspond to a 2% overall mortality (47).

Pregnancy loss

There are currently limited data on outcomes after first-trimester COVID-19 infection (17, 22, 23, 28, 31, 32, 35, 37). An increase in the risk of miscarriage in women affected by COVID-19 cannot be ruled out at this stage, given the SARS-CoV data (22) and the fact that severe maternal illness with fever is associated with miscarriage. A series from Rome of 7 women with COVID-19 includes one first trimester miscarriage at 8 weeks (48), without established causality. A case of second trimester miscarriage (19 weeks) in a woman with COVID-19 infection has recently been reported; the placental swabs were positive for SARS-CoV2, (49)

There is no evidence currently that the virus is teratogenic (20, 22, 23), but it is early in the course of understanding COVID-19 infection in pregnancy. SARS-CoV2 only emerged in December 2019, and there are as yet no longitudinal pregnancy studies reporting data. There are mixed data regarding the risk of congenital malformations in the setting of maternal fever in general (3).

The early literature includes one third-trimester stillbirth (26) and one neonatal death at 34 weeks (39) but whether both are directly related to COVID-19 infection is unclear from the details given (22, 24, 26, 42); the neonate reported tested negative for COVID-19 infection and there is no information about the stillbirth. In the first Iranian maternal death case report, the baby was also stillborn following a 30 week preterm delivery (43). The Iranian series published in AJOG which reports 9 pregnant women with severe COVID-19 disease, includes 5 stillbirths at gestations from 24-38 weeks and a neonatal death of 28 week twins (44); these infants appears to have tested negative for SARS-CoV2 or not been tested.

Pregnancy complications

Among the early reported cases, 15/32 (47%) women affected by COVID-19 delivered preterm (22, 24, 26, 41, 42), and these data informed some of the initial guidance about management of the third trimester of pregnancy. There are also case reports of preterm birth in women with COVID-19, but it is unclear whether the preterm birth was always iatrogenic, or whether some were spontaneous (20, 22), and it is not clear that these outcomes were related to maternal infection in every case (23, 30). In about a third of reported cases the preterm delivery was indicated by fetal distress (22).

There are no data on fetal growth in the ongoing pregnancies reported (28, 29, 36, 37, 38) at the time of publication, although presumably this will be available in time (36). In many reported cases, women were either in late pregnancy when affected, or delivered within 2 weeks of the onset of illness (22, 24, 31, 41, 42).

Vertical transmission

With regard to vertical transmission (transmission from mother to baby antenatally or intrapartum), emerging evidence now suggests that vertical transmission is probable (50, 51, 52), although the proportion of pregnancies affected and the significance to the neonate has yet to be determined (20, 23, 51, 52). It is clear that the evidence for vertical transmission is not robust and these studies should be interpreted with caution (53).
Previous case reports from China suggested that there was no evidence for vertical transmission and amniotic fluid, cord blood, neonatal throat swabs, placenta swabs and breastmilk samples from COVID-19 infected mothers have so far all tested negative for the virus (20, 22, 41, 42).

A recent report describes a single pregnancy in which the infant born to a COVID-19 positive mother was found to have SARS-CoV-2 IgM in serum at birth, but otherwise tested negative for COVID-19 infection. As IgM does not cross the placenta, the authors suggest this may represent a neonatal immune response to in-utero infection (50).

There are currently no data on perinatal outcome when the infection is acquired in the first and early second trimester of pregnancy.

Two women who had COVID-19 infection in the first trimester underwent amniocentesis in the second trimester (approximately 8 weeks later); amniotic fluid was negative for SARS-CoV-2 in both cases (54).

There is no evidence that delayed cord clamping increases risk of infection to the newborn via direct contact but the majority of pregnancies reported have been delivered by caesarean section and not all studies report detail on cord clamping. In the early series, those that did report, described immediate cord clamping with neonatal separation (20, 22, 24, 41).

**Neonatal / infant complications**

The presentation of COVID-19 in paediatric patients appears to be much milder than in adults. By contrast with findings in adults, children with COVID-19 had milder clinical manifestations; nearly half of paediatric patients reported have been asymptomatic (55).

Consistent with previous studies, the clinical symptoms from 33 neonates with or at risk of COVID-19 were mild and outcomes were favourable. Of the 3 neonates with symptomatic COVID-19, the most seriously ill neonate may have been symptomatic from prematurity, asphyxia and sepsis, rather than COVID-19 infection, and all recovered. These authors state that as strict infection control and prevention procedures were implemented during the delivery, it is likely that the sources of SARS-CoV-2 in the neonates were maternal in origin, but that they cannot rule out vertical-maternal-fetal transmission in their cohort (56).

Overall, and excluding duplicate reports, the literature to date now includes 10 neonates who tested positive for COVID-19 infection (31, 44, 52, 56, 57, 58) after birth and 3 other infants who were found to have IgM antibodies to COVID—19/ SARS-CoV-2 (50, 51). This is not in itself complete proof of vertical transmission. All outcomes in the infants who were antibody positive appear to have been good.

It is not yet clear whether COVID-19 can be transferred via breast milk. Other coronaviruses are destroyed by pasteurisation but there is no evidence to inform whether COVID-19 (if present) would be similarly destroyed. Small studies to date have not identified SARS-CoV2 in breast milk.

**Perinatal Pathology**

In the UK, pathogens are categorised according to their risk to humans by the Advisory Committee on Dangerous Pathogens (ACDP) within the Health and Safety Executive. ACDP guidance is largely aimed towards staff in clinical and research-related microbiology laboratories, however given the potential risk to the health of mortuary staff, autopsy practice has been adapted to reflect the risk of transmission of infectious pathogens during and after the post-mortem examination. These hazard groups (HG1–4) are assigned according to the risk of human infection, the likelihood spread and access to treatment or prophylaxis. SARS-CoV 2 has recently been categorised as a HG3 organism (59). Similarly, the 2013 Code of
Practice for the Safety, Health and Welfare at Work (Biological Agents) Regulations 2013 lists SARS Coronavirus as a ‘group 3 biological agent’ (60).

There are a limited number of descriptions of the pathology of COVID-19 infection. A report on 2 lung cancer resection patients, retrospectively identified as having COVID-19 describes the early changes of COVID-19 and were essentially non-specific (61).

In advanced disease a report on post-mortem biopsies from one case have shown features compatible with diffuse alveolar damage with hyaline membrane formation. The inflammation was predominantly lymphocytic, and multinucleated giant cells were seen alongside large atypical pneumocytes. No definitive viral inclusions were seen (62).

Limited placental pathology is available to date from COVID-19 positive pregnancies (20, 22, 23). One report examined placental pathology in 3 cases and described no unusual findings (63). Placental histology of the second trimester miscarriage case (49) demonstrated mixed inflammatory infiltrates, with funisitis (inflammation of the umbilical cord connective tissue suggesting a fetal inflammatory response) was also present.

**Summary**

COVID-19 infection is a new disease and the impact on pregnancy remains uncertain. Larger case series appearing in the literature offer reassurance that COVID-19 infection in pregnancy does not appear to be different to that in the non-pregnant population. At present, there is no evidence that pregnancy increases a woman’s risk of acquiring COVID-19 or developing severe symptoms from the disease. However, some women develop critical illness, and maternal deaths due to COVID-9 have been reported. It is currently considered possible, but not proven, that SARS-CoV-2 can be transmitted vertically. There is as yet limited evidence to support changing routine care practices in labour and at delivery.
COVID-19 Assessment and testing pathway for use in a HOSPITAL SETTING

At entry to hospital: Segregate possible COVID-19 and non COVID-19 patients into two Parallel Streams

Criteria for COVID-19 parallel stream:

- New onset of acute respiratory infection (Including any one of fever, cough or shortness of breath;;
- Influenza-like illness; or hypoxic respiratory failure in a previously healthy person
- OR
- Acute deterioration of existing respiratory disease requiring hospital assessment
- OR
- Temperature above 38°C or chills in the absence of reasonable evidence of infection at a non-respiratory site

Clinical judgement should be applied in application of these criteria to determine who requires testing.
Clinicians should be alert to the possibility of atypical (including non-respiratory) presentations in older patients, younger patients and in those who are immunocompromised.

Patients should wear a surgical mask, if tolerated.

Assess and rapidly differentiate into discharge to Home/Community management versus need for Acute Hospital Management

If patient is well and does not need hospital admission:

- If asymptomatic and belongs to a group prioritised for testing as detailed in Telephone assessment and testing pathway for persons who phone general practice and hospital services, either than calling hospital, ask patient to return home and contact GP to arrange testing. If the patient does not have a GP, they will be facilitated, as detailed above. Do not use 999 OR 112.
- If not in these prioritised groups, testing is not needed.
- The patient may be driven home by a person who has already had significant exposure, who is aware of the risks and who is willing to drive them. If patient had driven themselves, they may drive home if feeling well enough to drive.
- Whether a patient is in a group prioritised for testing or not, they should be advised to remain in self-isolation pending test result.
- Refer to the Patient Information sheet for self-isolation.
- The whole population is being asked to stay at home, where possible. Additional restrictions for household contacts are outlined in the information leaflet. Advice for people who share a home with someone who has symptoms of Coronavirus.

Discharge to Community

Admission to Hospital

- ISOLATE in a single room if possible
- STANDARD, CONTACT & DROPLET PRECAUTIONS
- See Laboratory guidance for COVID-19 for details on SARS-CoV-2 testing. Compressed swab for NASOPHARYNGEAL and OROPHARYNGEAL SAMPLE (one swab to test both is sufficient) or Bronchoalveolar lavage (BAL) or ENDOTRACHEAL ASPIRATE or SPUTUM (if produced).
- ADVICE available from the National Isolation Unit (NIU) (adults): 01-830 1222 and OR (pediatrics): 01-409 6190 as required (Ask for ID Consultant on call).
- Continue isolation in a single room while awaiting test results.

- Laboratory to inform clinicians and input data on CDHR
- All patient management to be supported by input from B (Clinician/Microbiologist) in line with IFD guidance
- PUBLIC HEALTH to input information from test results on CDHR

Version 14.0 Publication date: 27/04/2020

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/algorithms/
Outpatient Assessment and Management for Pregnant Women with Suspected or Confirmed Novel Coronavirus (COVID-19)

This algorithm is designed to aid practitioners in promptly evaluating and treating pregnant persons with known exposure and/or those with symptoms consistent with COVID-19. Please use this in conjunction with COVID-19 Assessment and testing pathway for use in a HOSPITAL SETTING.

Assess Patient’s Symptoms
Symptoms typically include:
- A fever (38 degrees Celsius or above)
- A cough
- Shortness of breath or breathing difficulties

Conduct Illness Severity Assessment
Does she have difficulty breathing or shortness of breath?
Does she have difficulty completing a sentence without gasping for air or needing to stop to catch breath frequently when walking across the room?
Does patient cough more than 1 teaspoon of blood?
Does she have new pain or pressure in the chest other than pain with coughing?
Is she unable to keep liquids down?
Does she show signs of dehydration such as dizziness when standing?
Is she less responsive than normal or does she become confused when talking to her?

Elevated Risk
Proceed to bring the patient to the designated isolation area.
Notify senior management and follow the recommended local protocols.
Ensure to continue to speak with the woman and tell her what is happening. Try to minimize the chance of spreading infection to other patients and/or healthcare workers at the facility. Adhere to local infection control practices including personal protective equipment.

Moderate Risk
See patient as soon as possible in an ambulatory setting with resources to determine severity of illness. When possible, send patient to a setting where she can be isolated. Clinical assessment for respiratory compromise includes physical examination and tests such as pulse oximetry, chest X-ray, or ABG as clinically indicated. Pregnant women (with abdominal shielding) should not be excluded from chest CT if clinically recommended.

Low Risk
Refer patient for symptomatic care at home including hydration and rest
Monitor for development of any symptoms above and re-start algorithm if new symptoms present
Routine obstetric precautions

Assess Clinical and Social Risks
Comorbidities (Hypertension, diabetes, asthma, HIV, chronic heart disease, chronic liver disease, chronic lung disease, chronic kidney disease, blood dyscrasia, and people on immunosuppressive medications)
Obstetric issues (eg, preterm labor)
Inability to care for self or arrange follow-up if necessary

Admit patient for further evaluation and treatment. Review hospital or health system guidance on isolation, negative pressure and other infection control measures to minimize patient and provider exposure.

Adapted from the American College of Obstetrics and Gynaecologists, 2020
Maternity care considerations

Routine antenatal care

Women should be advised to attend routine antenatal care unless they meet current self-isolation guidance for individuals and households of individuals with symptoms of new continuous cough or fever.

Women should attend clinic on their own and are asked to only come at their designated time to avoid too many people in waiting areas.

Units may need to consider adopting tele-conferencing and video-conferencing capability and consider what appointments can be conducted remotely. This may not be feasible where women carry their own (paper) charts and where more limited information is available in the maternity unit.

Record keeping remains paramount. Electronic record systems should be used and, where remote access for staff or patients is an available function, this should be expedited. When seeing women face to face, simultaneous electronic documentation will facilitate future remote consultation.

Individualised plans for women requiring more frequent review (and/or those with high-risk conditions) by healthcare staff in the maternity unit may be necessary.

Units should appoint a group of clinicians to co-ordinate care for women forced to miss appointments due to self-isolation. Women should be able to notify the unit of their self-isolation through phone numbers that are already available to them. Appointments should then be reviewed for urgency and either converted to remote appointments, attendance appropriately advised or deferred.

For women who have had symptoms, appointments can be deferred until 14 days after the start of symptoms. For women who are self-isolating because someone in their household has possible symptoms of COVID-19, appointments should be deferred for 14 days.

Units should have a system to flag women who have missed serial appointments, which is a particular risk for women with small children who may become repeatedly unwell, and any woman who has a routine appointment delayed for more than 3 weeks should be contacted.

For women who are self-isolating at home, ensure they stay well hydrated and are mobile throughout this period. Women who have thromboprophylaxis already prescribed should continue taking this. If women are concerned about the development of venous thromboembolism (VTE) during a period of self-isolation, a clinical review (in person or remotely) should be attempted to assess VTE risk, and thromboprophylaxis considered and prescribed on a case-by-case basis.

Pregnant women will continue to need at least as much support, advice, care and guidance in relation to pregnancy, childbirth and early parenthood as before the pandemic. Units will also need to consider alternatives (virtual; online, recorded) to the delivery of parentcraft education during this time.

It is important that care is available to ensure continuation of support for women with multiple complex needs. Women living with adversity including poverty, homelessness, substance misuse, being an asylum seeker, experiencing domestic abuse and mental health problems will continue to require timely expert support.
Isolation, bereavement, financial difficulties, insecurity and inability to access support systems are all widely recognised risk factors for mental ill-health. The coronavirus epidemic increases the risk of perinatal anxiety and depression, as well as domestic violence. It is critically important that support for women and families is strengthened as far as possible; that women are asked about mental health at every contact; and that women are urged to access support through remote means as far as possible.

**Maternal Medicine / Obstetric complications**

A senior obstetrician with a specialist interest in maternal medicine should assess all new referrals of pregnant women with medical disorders. Particular consideration should be made to combine additional blood tests with those taken at the booking appointment. This will facilitate planning for one-stop booking clinics, preventing the need for the woman to re-attend the hospital for additional tests when requested by her maternal medicine team.

Routine obstetric checks (e.g. measurement of fundal height, urinalysis, and blood pressure) conducted at midwifery/general practice appointments need not be repeated in maternal medicine clinics. Maternal medicine clinics can therefore use telephone or video consultations instead of face-to-face encounters for some visits. Remote consulting reduces the need for women to travel, enter a hospital, and be within two metres of others, and thus reduces their risk of infection. It also reduces footfall in the clinic and therefore makes social distancing within the clinical area more achievable, reducing the risk of infection to staff and other vulnerable patients there.

A minority of maternal medicine clinic appointments will need to be face-to-face, primarily when the woman is having a physical interaction such as an obstetric scan, an echocardiogram, or requires blood testing. Face-to face interactions should be limited by reviewing the purpose of the appointment in advance (ideally one week earlier) and ensuring that the relevant tests/treatments can all be done in a single visit.

At the end of each appointment, question whether the next appointment is medically necessary, whether it can be conducted remotely, and whether it can be tied up with other necessary appointments and use local arrangements to streamline care.

The HSPC/HSE have identified individuals with which are considered vulnerable to severe COVID-19 disease. Adults with some co-morbidities have been identified as ‘extremely vulnerable’ to the severe effects of COVID-19 and should be ‘cocooned’. Therefore pregnant women with the following conditions should adhere to these recommendations.

Maternity services should familiarise themselves with this guidance and make modifications to care as appropriate:

- Women who are pregnant with solid organ transplant recipients
- Women who are pregnant with cancer
- Women who are pregnant with severe respiratory conditions including cystic fibrosis, severe asthma and severe COPD.
- Women who are pregnant with rare diseases and inborn errors of metabolism that significantly increase the risk of infections (such as SCID, homozygous sickle cell).
- Women who are pregnant on immunosuppression therapies sufficient to significantly increase risk of infection.

Finally, it is important to remember that routine laboratory services may not be functioning in the same way as normal during the COVID-19 pandemic. Units should liaise with laboratory services to make alternative arrangements and ensure a plan is place for urgent or clinically important tests.

[https://www2.hse.ie/conditions/coronavirus/cocooning.html](https://www2.hse.ie/conditions/coronavirus/cocooning.html)
Hypertension

The obstetric team should first review the woman at 10-14 weeks by remote consultation (or in person if aligned with an 11-13 weeks’ dating ultrasound scan). This review should assess the risk status, plan care and ensure that the pregnant woman has prescriptions for antihypertensive medication and low-dose aspirin.

- Send blood for urea & electrolytes (U&E) and urine for protein: creatinine ratio (urinary PCR) with the booking bloods.
- Consider arranging for the woman to self-monitor her blood pressure where possible, and where the supervision, expertise and technology exists.
- Arrange obstetric reviews at the same visit as ultrasound scans.
- For all other antenatal reviews, plan for remote review as much as possible.

Pre-eclampsia

A face-to-face encounter is necessary to assess a woman with suspected pre-eclampsia for assessment of disease severity and fetal wellbeing.

If a woman with pre-eclampsia is managed as an outpatient:

- Arrange for her to self-monitor her blood pressure every 2 days (again, where the expertise and technology is available for supervision of home-monitoring) and have blood tests for preeclampsia according to the recommended schedule.
- Increase the intensity of monitoring depending on the predicted risk status and clinical findings.
- Arrange for a healthcare professional review twice a week, at the time of the blood tests or fetal growth scans, for women managed as outpatients.

For all women with hypertensive disorders in pregnancy, review postnatal antihypertensive medication with senior input to optimise blood pressure control and minimise the length of postnatal stay in the hospital. Advise women to self-monitor their blood pressure at least 2-3 times in the first week after discharge home, under supervision.

Pre-existing Diabetes

Adults with pre-existing diabetes have been identified as being more vulnerable to the severe effects of COVID-19 infection. They have been advised to stringently follow social distancing measures. Additional tests at the booking appointment for pregnant women with pre-existing diabetes should include early face-to-face review being organised. If this review is needed, this should coincide with the 11-14 week scan and booking bloods.

This review should cover:

- HbA1c, renal and thyroid function, and urinary PCR.
- 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,
- Information on hypoglycaemia avoidance and awareness for women using insulin.
- Prescription for folic acid and low dose aspirin.
- Care planning which involves the diabetic specialist nurse or midwife.
- To reduce the number of hospital visits, consider recommending retinal screening only to women with known retinal changes prior to pregnancy.
- Consultations by the diabetes team for the purpose of reviewing home capillary blood sugar levels should be done remotely, wherever possible.
- All women should continue to have antenatal care with their team (e.g. to include blood pressure and urinalysis), remotely where possible.

The obstetric team should otherwise aim to review the woman as a minimum and if face-to-face reviews are required, these visits should coincide with planned ultrasound appointments.
and at 34-36 weeks’ gestation, to comprehensively assess maternal and fetal condition, and plan timing and mode of birth. If feasible and appropriate, this can be done remotely.

Women affected by COVID-19 infection and who are symptomatic should be aware of the potential effects of infection on blood sugar control and should be advised that they will need more frequent review of home capillary blood sugars and ketones (where appropriate), which can be arranged remotely by the diabetes team.

**Gestational Diabetes (GDM)**

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 should be done remotely via video call. This visit should also be used as an opportunity to provide women with dietetic information and contact details of the dietician, where one is available.

Women should be followed-up remotely in the week after the meter training by the diabetes midwife/nurse and for all appointments where home capillary blood sugar levels are to be checked by the diabetes team.

In women who have GDM that is diet-controlled, with blood glucose levels consistently in the target range 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 >3 abnormal blood glucose levels in a week or >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 the specified targets.

In women who have GDM and are taking metformin and/or insulin, offer obstetric review remotely at 28 and 32 weeks’ gestation to reassess the risk status. If face-to-face obstetric reviews are needed, for example in women with additional risk factors or poorly controlled blood sugars, ensure that these reviews coincide with any planned ultrasound appointments. Offer obstetric review at 36 weeks, to comprehensively assess maternal and fetal condition, plan timing and mode of birth, and plan follow-up care until birth.

If women who are taking metformin become symptomatic with COVID-19 infection it would seem prudent to consider stopping the metformin because of the risk of hypoxia.

**Cardiac disease**

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

- It is a risk factor for maternal death and requires careful multidisciplinary care.
- COVID-19 infection appears to carry a significantly greater risk of death in patients with cardiovascular disease.

Public health measures such as shielding, distancing and isolation aim to lower the risk of COVID-19 exposure but increase the risk of women not receiving adequate pregnancy care.

- Plan face-to-face care around essential investigations, e.g. echocardiogram, and ‘piggy-back’ obstetric care (e.g. scans) to minimise repeated hospital visits.
- Arrange telephone/telemedicine consultations when essential face-to-face investigations are not required.
- Provide women with a reliable contact number to call with any care queries.
- Involve anaesthetists as early as possible in birth planning. These plans are often difficult to make but easy to execute, and anaesthetists will be under huge pressure to look after ventilated COVID-19 patients elsewhere.
**Haematology/Venous thromboembolism (VTE)**

Isolation at home is likely to cause a significant reduction in daily mobility, which may increase the risk of VTE in all pregnant women. The risk of thrombosis among this group is high and consideration for VTE prophylaxis should occur following discussion with a haematologist.

Decisions on thromboprophylaxis and imaging for confirmation of VTE should be made on a case-by-case basis, involving senior obstetricians, physicians and radiologists.

**Preconception counselling**

Preconception counselling in a hospital setting, for women with medical problems, should be deferred during the pandemic and replaced with advice to delay pregnancy and use reliable contraception. Review should be arranged when system capacity returns.

**Unscheduled care**

All women presenting at the maternity Emergency Department (ED) or early pregnancy clinic (EPC) should be triaged and asked about symptoms of COVID-19 infection as well as pertinent risk factors. It is important to remember that women may have attended other units or hospitals, or been tested (or awaiting a test result) in the community, and should be specifically asked about this.

Appropriate communication needs to be ensured with pregnant women for whom English is not their first language.

Women who become unwell or who are experiencing complications in pregnancy should still be encouraged to present for review at the maternity ED.

A women who is presenting at the unit with COVID-19 symptoms should be dealt with in an isolation room.

If possible the ED/EPC should be kept for emergencies occurring during pregnancy and staff rostered to work in ED/EPC should if at all possible be kept to work in this area only.

To minimise the possibility of infection, approved social distancing protocols should be enacted in all ER/EPC clinical and waiting areas.

**Early pregnancy care**

The inevitable reduction in resources and capacity, as well as the aim to minimise hospital attendance for social distancing of pregnant women, have led to a general recommendation (international) of one of the following three options:

- Scans and/or visits that need to be undertaken without delay;
- Scans and/or visits that can be delayed without affecting clinical care;
- Scans and/or visits that can be avoided for the duration of the pandemic.

Rationalising visits should ensure that those at risk of early pregnancy complications continue to be looked after. Where scans are deferred or delayed, women must be contacted to ensure that they present if unwell, and where possible are given alternative appointments or clinical options.

Women diagnosed with miscarriage should be managed in accordance with local protocols. There should be an effort to reduce inpatient admission: offer expectant management for incomplete miscarriage and consider medical management. Telephone follow up for PUL can be considered as well as use of conservative management after PUL or following medical management.
The availability of surgery will need to be reviewed locally on a daily basis and if surgical management is indicated, appropriate precautions related to personal protective equipment (PPE) should be taken. Regional anaesthesia may be considered in COVID-19 positive women to reduce the risk to staff from general anaesthesia, which is an aerosol-generating procedure.

Women with ectopic pregnancy should be managed in accordance to local protocols with an emphasis on conservative management if possible. Surgical management of ectopic pregnancy may still be considered, but only following senior review of the ultrasound scan, beta-hCG results and clinical findings. However, laparoscopic surgery should only be undertaken with strict precautions taken to filter any CO2 escaping into the operating theatre and the theatre staff wearing appropriate PPE.


Women with early pregnancy complications should still be referred to appropriate counselling services and to reliable, accurate online sources of information.

ISUOG have provided useful suggestions for triage of early pregnancy scans:


Ultrasound scans and surveillance in pregnancy

Ultrasound is an essential part of obstetric care, but exposes the patient and the caregiver to high risks, given the impossibility of keeping the recommended distance between them during the ultrasound scan. It is therefore essential to take all possible precautions when undertaking routine clinical activity.

Recommendations for ultrasound practice

Following ultrasound examination, ensure surfaces of transducers are cleaned and disinfected according to manufacturer specifications. Consider using protective covers for probes and cables, especially when there are infected skin lesions or when a transvaginal scan is necessary. In the case of high infectivity, a ‘deep clean’ of the equipment is necessary. A bedside scan is preferred; if the patient needs to be scanned in the clinic, this should be done at the end of the clinic, as the room and equipment will subsequently require a deep clean.

In order to reduce the risk of transmission, it is important to respect the time of scheduled visits, to widen the appointment intervals in order to prevent crowding in the waiting room and to space the seats to at least a 2 meters apart.

It is recommended that providers use a three-ply surgical mask when performing ultrasound scans as there is direct and frequent patient contact in close proximity. The surgical masks may be reused during the care of multiple patients, if used to protect the healthcare provider from an activity with low transmission risk, such as ultrasonography. Replace the mask as soon as it is damp and do not reuse single-use masks.

Hand hygiene is imperative before and after direct patient contact. If it is not possible to wash hands, hand sanitizer can be used. Latex-free disposable gloves should be used during the ultrasound examination and changed after each patient.

Providers should attempt to shorten the duration of the examination by arranging for the most experienced sonographer to perform for example, anomaly ultrasound scan examinations.
Consideration can be also given to reducing the contact time for anomaly scans to 15 minutes, and to not providing repeat scans unless an anomaly is suspected or the gestational age is incorrect. These limitations should be recorded on the scan report. Labelling of images should be kept to a minimum to facilitate this, and all details regarding the pregnant woman’s history and previous scans reviewed before she enters the scan room. In some units it may be more practical to consider limiting the time for all scans to 12 minutes and thus reducing the direct patient contact time.

With COVID-19 visiting restrictions, the pregnant woman will be attending the scan on her own. She should also be advised that detailed explanations will not be given during the examination. Hospital policy about the recording of images or provision of scan pictures should also be explained.


Fetal Medicine

Fetal Medicine Services are essential to the provision of routine Obstetric Care. All referrals to Fetal Medicine Services should be discussed with a Fetal Medicine consultant prior to referral. For some women, delaying the appointment until after the period of self-isolation or until recovered from the illness, may be clinically acceptable. Consideration should be given to reducing the number of staff that attend these clinics.

In general, pregnant women should attend alone and be screened before entering the hospital for symptoms of COVID-19 infection. If symptoms are present then a discussion with the fetal medicine consultant covering the unit should occur. She/he will review the reason for referral and decide if the patient needs to be seen on that day; if the decision is to postpone the evaluation it should be communicated clearly to the patient and a new appointment given.

Fetal Medicine screening such as fetal echocardiography should be deferred if the anomaly scan with normal cardiac views has been performed.

The need for invasive prenatal diagnosis should be decided on an individual basis by a Fetal Medicine Consultant. Patients who require urgent review, such as fetal hydrops or fetal growth restriction should be seen, following risk assessment, with appropriate PPE provided as indicated by the clinical situation.

Therapeutic Procedures should continue with appropriate PPE provided after risk assessment for COVID-19; these procedures include:

a. Laser ablation for Twin to Twin Transfusion Syndrome
b. Intrauterine Transfusion for fetal anaemia
c. Shunting procedures
d. Amniodrainage

Cases that have been delayed but require diagnostic testing and/or discussion regarding termination of pregnancy should still be discussed at a weekly MDT meeting (consider teleconferencing for this MDT meeting).

The RCOG have provided useful suggestions for triage of routine ultrasound services.


The Society of Maternal Fetal Medicine has published the guideline: “The Society for Maternal-Fetal Medicine COVID-19 Ultrasound Practice Suggestions”.

https://s3.amazonaws.com/cdn.smfm.org/media/2272/Ultrasound_Covid19_Suggestions_(final)_03-24-20_(2)_PDF.pdf

Triage and risk factor screening

Before entering the maternity unit, pregnant women should be triaged at entry to the hospital or department (or clinical area). All those entering the maternity unit/services should be asked if there has been recent onset of fever or chills and signs or symptoms of respiratory tract infection, which includes cough or shortness of breath. Clinical judgement should be employed when assessing these criteria, as pregnant women may present with atypical symptoms alongside fever or chills. These symptoms include myalgia, diarrhoea, abdominal pain and anosmia.

Possible COVID-19 and non COVID-19 patients should be separated into two parallel streams for subsequent assessment and clinical review.

If the patient is well and does not need hospital admission: then recommend the woman returns home and contact her GP to arrange testing or undertake local maternity testing if available. However, if the woman has an additional co-morbidity or develops an obstetric condition that is likely to require further assessment in the maternity service e.g. obstetric cholestasis, gestational hypertension, fetal growth restriction, or is >34 weeks’ gestation then testing should be prioritised and arranged through local maternity pathways.

Maternity units should consider contacting women the day before elective admission for Caesarean section or induction of labour, in order to triage and ask about symptoms. If these meet the case definition, elective admission and management can be better planned.

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/algorithms/

Management of COVID-19 suspected and/or confirmed infection in pregnancy

Diagnosis of COVID-19 infection

Any suspected case should be tested for COVID-19 infection using available molecular tests, such as quantitative reverse transcription polymerase chain reaction (qRT-PCR). This is usually through the collection of upper-respiratory-tract specimens of combined nasopharyngeal and oropharyngeal swabs. Bearing in mind the possibility of false negative results, if a strong clinical suspicion persists in an unwell patient, a retest should be considered.

Chest imaging, especially CT scan, has proven essential for evaluation of the clinical condition of adults with COVID-19 infection.

Fetal growth restriction (FGR), microcephaly and intellectual disability are the most common reported adverse effects from high-dose (>610mGy) radiation exposure. According to data from the American College of Radiology and American College of Obstetricians and Gynecologists, when a pregnant woman undergoes a single chest X-ray examination, the radiation dose to the fetus is 0.0005–0.01 mGy, which is negligible, while the radiation dose to the fetus is 0.01–0.66 mGy from a single chest CT or CT pulmonary angiogram.

https://www.acr.org/-/media/ACR/Files/Practice-Parameters/Pregnant-Pts.pdf

Chest CT scanning has high sensitivity for diagnosis of COVID-19 infection. In a pregnant woman with suspected COVID-19 infection, a chest CT scan may still be considered as a
primary tool for the detection of COVID-19 in epidemic areas, and used as available. Informed consent should be acquired (with shared decision-making) and a radiation shield be applied over the gravid uterus.


Management at home, isolating

Pregnant women with a mild clinical presentation may not initially require hospital admission and home confinement can be considered, provided that this is possible logistically and that monitoring of the woman’s condition can be ensured.

If a woman is recommended to self-isolate after clinical assessment, it is advised that she returns home and does not go out for 14 days. She can stop self-isolating once she has had no temperature for 5 days and it has been 14 days since she developed any symptoms.

She should be provided with appropriate information and referred to helpful sources, and given contact details for the hospital.
  - Suggest separating themselves from other household members (use own bed, bathroom, towels, crockery and utensils) if possible.
  - Suggest recommending continued appropriate food choices, and suggest to try and exercise within limits in the household.

Maternity units should allow for telephone clinics for to check on women who have been told to self-isolate at home.

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/selfisolationathome/

It should be emphasized that COVID-19 patients can decompensate after several days of apparently mild illness, and women should be instructed to call or be seen for care if symptoms, particularly shortness of breath, worsen.

Antenatal Care

Pregnant women with confirmed infection who are asymptomatic or recovering from illness in an ongoing pregnancy, should be monitored with 2–4-weekly ultrasound assessment of fetal growth and amniotic fluid volume, with umbilical artery Doppler if necessary (from 24 weeks gestation).

Outpatient care

In the setting of a mild infection, management similar to that for a patient recovering from influenza is reasonable. Given how little is known about this infection, a detailed mid-trimester anomaly ultrasound examination should be provided following first-trimester maternal infection. For those experiencing illness later in pregnancy, it is reasonable to consider regular sonographic assessment of fetal growth in the third trimester.

Routine appointments for women with suspected or confirmed COVID-19 (growth scans, OGTT, antenatal community or secondary care appointments) should be delayed until after the recommended period of self-isolation. Routine vaccinations (e.g. pertussis) should continue after the illness.

Advice to attend more urgent pre-arranged appointments (fetal medicine surveillance, high-risk antenatal care) will require a senior clinician’s decision on urgency and potential risks/benefits.
Local maternity services are advised to arrange local, robust communication pathways for senior maternity staff members to screen and co-ordinate appointments missed due to suspected or confirmed COVID-19 infection.

If it is deemed that obstetric or midwifery care cannot be delayed until after the recommended period of isolation, IPC measures should be arranged locally to facilitate care e.g. separate COVID19 clinics in areas of hospital away from other clinical areas. Pregnant women in self-isolation who need to attend should be contacted by a local care coordinator to re-book urgent appointments / scans, preferably at the end of the working day. It is important that this is documented clearly in the woman’s healthcare record as if she attends for an unscheduled visit this needs to be communicated to healthcare providers so that she can be appropriately isolated.

**Women who develop new symptoms of COVID-19 during inpatient admission**

There is an estimated incubation period of 0-14 days (mean 5-6 days); an infected woman may therefore present asymptomatically, developing symptoms later during an admission. Women from at risk groups (e.g. Roma, Direct provision) and women with poor communication skills should be considered for testing on admission if there is any uncertainty.

Health professionals should be aware of this possibility, particularly those who regularly measure patient vital signs. In the event of new onset of respiratory symptoms or unexplained fever of or above 37.8 degrees following admission, the woman should be isolated and appropriate infection control precautions initiated in line with HSPC Guidance. The local IPC team should also be notified so that appropriate investigations can be carried out. It is recognised that this may lead to substantial numbers of women treated as suspected COVID-19 infection. Suspected COVID-19 infection should not delay administration of therapy that would be usually given (for example, IV antibiotics in a woman with fever and prolonged rupture of membranes).

VTE risk assessment should be carried out on all women who are admitted with COVID-19 infection. VTE prophylaxis with low molecular weight heparin (LMWH) at standard obstetric dosing is recommended initially for all pregnant women with confirmed or suspected COVID-19 (unless they are within 12 hours of birth). Where women with complications of COVID-19 infection are under the care of other teams, such as intensivists or acute physicians, the appropriate dosing regimen of LMWH should be discussed in an MDT that includes a senior obstetrician and a local VTE expert. ([Appendix 5; VTE Prophylaxis Protocol](https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/))


https://hse.drsteevenslibrary.ie/ld.php?content_id=32860341

The Irish Maternity Early Warning System (IMEWS) should be used for the hospital care of a woman with a confirmed clinical pregnancy and for up to 42 days in the postnatal period irrespective of age or reason for presentation to hospital. The standard IMEWS vital signs must be recorded as a baseline on admission to hospital. These are: respiratory rate, temperature, maternal heart rate, systolic blood pressure, diastolic blood pressure and neurological response. The subsequent frequency of observations should be determined by the baseline recordings and the woman’s individual clinical circumstances.

For outpatient or inpatient care, it is also important to have a plan for the handling of documentation, such as where the pregnant woman is carrying her own medical chart. This will need to be in her vicinity, but the IPC advice is that the chart is at the maximum possible distance from the patient (greater than 2 metres), and that hand hygiene is observed by caregivers before and after using the chart.

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/
Antenatal corticosteroids for fetal lung maturation

With regard to the administration of maternal corticosteroids for fetal lung maturation, NICE guidance is as follows:

- 24 – 33+6 weeks: offer steroids
- 34 – 35+6 weeks: consider steroids.

This advice still stands. In circumstances where steroids would normally be given, do not routinely withhold them in a woman with COVID-19 infection; as yet, there is no evidence from the Coronavirus outbreaks that a course of corticosteroids for fetal lung maturation causes any clinically significant adverse effect on the mother’s illness.

However, in a critically ill pregnant woman, use caution regarding the use of antenatal steroids (dexamethasone or betamethasone). Consider whether administration of antenatal steroids could potentially worsen the clinical condition and whether it would delay delivery that if was necessary for management of the patient. The use of antenatal steroids should be considered in discussion with infectious-disease specialists, maternal–fetal-medicine specialists and neonatologists.

In cases where antenatal corticosteroids are considered in the late preterm the risks and benefits should also be discussed with a fetal medicine specialist.

Important considerations for care for the pregnant woman with confirmed COVID-19 infection (moderate/severe infection)

A multi-disciplinary discussion planning meeting ideally involving a consultant physician (infectious disease specialist where available), consultant obstetrician, consultant neonatologist / paediatrician, midwife-in-charge and consultant anaesthetist responsible for obstetric care should be arranged as soon as possible following admission. The discussion and its conclusions should be discussed with the woman.

The following should be discussed:

- Key priorities for medical care of the woman;
- Most appropriate location of care (e.g. intensive care unit, isolation room in infectious disease ward or other suitable isolation room) and lead specialty;
- Concerns amongst the team regarding special considerations in pregnancy, particularly the condition of the fetus.
- The priority for medical care should be to stabilise the woman’s condition with standard supportive care therapies.

Particular considerations for pregnant women are:

- Hourly observations, monitoring both the absolute values and the trends.
- Titrate oxygen to keep saturations >94%.
- Hourly respiratory rate looking for the rate and trends:
- Young fit women can compensate for a deterioration in respiratory function and are able to maintain normal oxygen saturations before they then suddenly decompensate. So a rise in the respiratory rate, even if the saturations are normal, may indicate a deterioration in respiratory function and should be managed by starting or increasing oxygen.
- Radiographic investigations should be performed as for the non-pregnant adult; this includes chest X-ray and CT of the chest. Chest imaging, especially CT chest, is essential for the evaluation of the unwell patient with COVID-19 infection and should be performed when indicated, and not delayed due to fetal concerns. Abdominal shielding can be used to protect the fetus as per normal protocols.
- Consider additional investigations to rule out differential diagnoses, e.g. ECG, CTPA as appropriate, echocardiography. The latter may be additionally indicated in pregnancy, noting reports of cardiomyopathy in COVID-19 infection.
• Do not assume all pyrexia is due to COVID-19 and also perform full sepsis-six screening.
• In view of the small risk associated with Metformin to cause lactic acidosis which is exacerbated in any clinical situation pre-disposing to hypoxia (Pneumonia etc), Metformin should be discontinued, and treatment with Insulin commenced for blood glucose control of Gestational Diabetes.
• Consider bacterial infection if the white blood cell count is raised (lymphocytes usually normal or low with COVID-19 infection) and commence antibiotics.
• Apply caution with IV fluid management. Try boluses in volumes of 250-500mls and then assess for fluid overload before proceeding with further fluid resuscitation.
• The frequency and suitability of fetal heart rate monitoring should be considered on an individual basis, taking into consideration the gestational age of the fetus and the maternal condition. If urgent delivery is indicated for fetal reasons, birth should be expedited as normal, as long as the maternal condition is stable
• Adults with COVID-19 infection who become unwell with severe acute respiratory distress syndrome (SARS) develop high troponin and high D-dimer levels. In this clinical setting, elevation of these biomarkers is not associated with myocardial infarction or thromboembolic disease. It is unknown how these biomarkers change in pregnant women with COVID-19 infection.
• However, it is well known that D-dimer levels are commonly elevated in healthy pregnancy, whereas cardiac troponin levels should remain within normal ranges throughout normotensive pregnancy.

**Considerations for care for the pregnant woman in ICU**

The overarching principle in managing the acutely ill pregnant woman is that optimal management of the condition, including essential imaging (see above) and medication (see below), is paramount. The fetus is always secondary to this.

The following issues need to be taken into account in a pregnancy:
• Use left lateral tilt after 20 weeks gestation if possible as aorto-caval compression significantly reduces cardiac output from 20 weeks of gestation thus reducing venous return and cardiac output by up to 30–40%,
• Prone positioning may not always be feasible, but should be considered in early (pre-viable) gestations of pregnancy.
• Changes in lung function, diaphragmatic splinting by the enlarged uterus and increased oxygen consumption make the pregnant woman become hypoxic more readily and can make ventilation more difficult.
• Difficult intubation is more likely in pregnancy because of large breasts inhibiting the working space and laryngeal oedema can contribute to make intubation more difficult.
• Pregnant women are at an increased risk of aspiration requiring early intubation with effective cricoid pressure and the use of H2 antagonists and antacids prophylactically.
• BP of 90/60 is a normal blood pressure in pregnancy and with hypertension the aim is to keep BP <150/100 mmHg. If there is organ damage, aim for BP <140 mmHg.
• Increased cardiac output means that large volumes of blood can be lost rapidly, especially from the uterus which receives 10% of blood volume at term.
• Significant blood loss can also exacerbate right-left shunts making critical care management of the cardiorespiratory function more difficult
• Due to increased risk of VTE – prophylaxis is required and should be continued following discharge from ICU for 6 weeks.

During acute illness, fetal management should be similar to that provided to any critically ill pregnant woman. Continuous fetal monitoring in the setting of severe illness should be considered only when delivery would not compromise maternal health or as another non-invasive measure of maternal status.

Due to the configuration of maternity services in Ireland, there are some tertiary referral hospitals providing critical care that do not have access to 24 hour obstetric, neonatal and midwifery coverage. This can pose unique challenges for management and delivery planning.
Each hospital should explore local pathways for provision of care and contact local obstetric services as soon as admission takes place (Appendix 2 – suggested pathway).

Management of labour (Appendix 3)

All women should be encouraged to call the maternity unit for advice in early labour. Women with mild COVID-19 symptoms can be encouraged to remain at home (self-isolating) in early (latent phase) labour as per standard practice. When a woman decides to attend the maternity unit, general recommendations about hospital attendance apply.

Once in an isolation room, a full maternal and fetal assessment should include:

- Maternal observations including temperature, respiratory rate and oxygen saturations (repeated hourly). The IMEWS should be used and appropriately recorded.
- Aim to keep oxygen saturation >94%, titrating oxygen therapy accordingly.
- Confirmation of the onset of labour, as per standard care.
- Electronic fetal monitoring using cardiotocograph (CTG).
- If the woman has signs of sepsis, investigation and treatment as per guidance on sepsis in pregnancy, but also consideration of active COVID-19 infection as a cause of sepsis and investigate according to guidance.
- There is no evidence that the use of Entonox is an aerosol-generating procedure (AGP). Entonox should be used with a single-patient microbiological filter, as is standard issue.

When a woman with confirmed or suspected COVID-19 is admitted to the delivery suite, the following members of the multi-disciplinary team should be informed: consultant obstetrician, consultant anaesthetist, midwife-in-charge, and consultant neonatologist, neonatal nurse in charge and infection control team.

Efforts should be made to minimise the number of staff members entering the room and units should develop a local policy specifying essential personnel for emergency scenarios and practice simulation and drills to ensure correct use of PPE.

The use of birthing pools in hospital should be avoided in suspected or confirmed cases, given the inability to use adequate protection equipment for healthcare staff during water birth and the risk of infection via faeces.

The WHO have set out the care that should be available to all pregnant women, including those with confirmed or suspected COVID-19 infections, and reiterated they should have the right to high quality care before, during and after childbirth. This includes antenatal, newborn, postnatal, intrapartum and mental health care.

According to the WHO, a safe and positive childbirth experience includes:

- Being treated with respect and dignity;
- Having a companion of choice present during delivery;
- Clear communication by maternity staff;
- Appropriate pain relief strategies;
- Mobility in labour where possible, and birth position of choice.


The RCOG / RCM guideline documents also state that “Women should be permitted and encouraged to have a birth partner present with them in their labour and during birth”. Having a trusted birth partner present throughout labour is known to make a significant difference to the safety and well-being of women in childbirth. A single, asymptomatic birth partner should be permitted to stay with the woman, at a minimum, through pregnancy and birth.”
It is therefore expected that as a minimum, pregnant women should have one birthing partner with them in labour, unless this partner is symptomatic or unwell, irrespective of the woman’s COVID-19 status. In situations where the woman has or is suspected to have COVID-19 infection there may be situations where regretfully this is not possible relating to PPE availability, workforce gaps or unit configuration. Local policies may also apply for the partner to wear PPE, and to stay in the room for the duration of the labour or delivery. In emergency scenarios for COVID-19 positive women, such as category 1 or 2 Caesarean section, it may not be feasible for the partner to attend the delivery in theatre.

It is important to acknowledge, that while the birth partner should be facilitated to be present, this may not be appropriate in all scenarios and situations may arise in the hospital/unit, where the presence of an additional person present may not be safe or practical. Units are encouraged to provide accessible information regarding visiting/accompanying partners.

**Decision to deliver**

Current consensus is that COVID-19 infection is not an absolute indication for ending pregnancy, but timing of delivery should be evaluated on a case-by-case basis. Main considerations are maternal clinical status and disease progression, gestational age and fetal condition.

Women with suspected or confirmed COVID-19 who are in labour and/or in the delivery suite should be placed in an isolation room with en-suite facilities. The door should remain closed with appropriate isolation signage (standard, droplet and contact) placed on the exterior door. The patient should remain in isolation throughout their hospital admission.

In the event that an infected woman has spontaneous onset of labour with optimal progress, she could be allowed to labour as normal and deliver vaginally. Continuous electronic fetal monitoring is recommended as fetal distress has been reported in women with COVID-19 infection. Recourse to early epidural anaesthesia should be considered. Induction of labour should be considered in pregnant women, where this would be the usual care plan.

There should be a lower threshold to expedite the delivery when there is fetal distress, poor progress in labour and/or deterioration in maternal condition. Caesarean delivery involves significantly more staff input and potential for exposure to SARS-CoV2.

In the case of a COVID-19 infected woman presenting with spontaneous preterm labour, tocolysis should not be used in an attempt to delay delivery in order to administer antenatal steroids. The neonatal team should be informed of plans for birth as soon as possible.

Until further information is available, it is best to avoid fetal scalp electrode monitoring and fetal blood sampling (consistent with recommendations for other maternal infections).

Given the association of COVID-19 with acute respiratory distress syndrome, women with moderate-severe symptoms of COVID-19 should be monitored using hourly fluid input-output charts, and efforts targeted towards achieving neutral fluid balance in labour, in order to avoid the risk of fluid overload.

**Management of delivery (Appendix 3)**

Timing of delivery, in most cases, should not be dictated by maternal COVID-19 infection. For women infected early in pregnancy who recover, no alteration to the usual timing of delivery is necessary.

For women infected in the third trimester who recover, it is reasonable to attempt to postpone delivery (if no other medical indications arise) either until a negative testing result is obtained or quarantine status is lifted in an attempt to avoid transmission to the neonate or others.
In general, COVID-19 infection itself is not an indication for delivery, unless there is a need to improve maternal oxygenation.

For suspected, probable and confirmed cases of COVID-19 infection, delivery should be conducted in an isolation room (negative pressure room, where available). A senior obstetrician should be present.

Septic shock, acute organ failure or fetal distress should prompt emergency Caesarean delivery or consideration given to termination of pregnancy under Health (Termination of Pregnancy) Act 2018 before fetal viability (sections 9 or 10).

Plans for emergency delivery (instrumental or operative) should be appropriately communicated in a timely manner with all relevant senior personnel on the delivery suite. Local plans needs to be in place about the number of staff involved in these scenarios, the use of PPE, as well as safe transfer from delivery suite to operating theatres if this becomes necessary.

If delivery in theatre is indicated, the minimum number of staff should be present and wearing appropriate PPE for their role and exposure risk. If intubation is required for CS under general anaesthesia the minimum of staff necessary should be present.

VTE prophylaxis should be considered for at least 10 days postpartum as per guidelines on sepsis in the peri-partum period.

**Anaesthesia considerations**

Liaise early with the obstetric anaesthesia team to plan delivery. The most experienced anaesthetist available should perform all procedures.

Both regional anaesthesia and general anaesthesia can be considered, depending on the clinical condition of the patient and after consultation with the obstetric anaesthetist. As many adults with COVID-19 infection developed thrombocytopaenia (platelet count <150) it is prudent to check the platelet count before insertion of epidural or spinal anaesthesia, and possibly again before removal of the epidural catheter.

Discuss neuraxial blockade before/early in labour to minimise the need for general anaesthesia if urgent delivery is required.

Consider transfer arrangements in different scenarios for a woman who needs an emergency caesarean delivery e.g. delivery suite room to theatre. Regular drills on the delivery suite, and with PPE, will help. An isolation theatre should be utilised with appropriate ventilation.

Donning PPE is mandatory and time consuming and this will impact on decision to delivery time for category 1 caesarean delivery, no matter what the anaesthetic technique used. Women and their families should be told about this delay.

Regional anaesthesia is recommended where possible to minimise pulmonary complications and reduce droplet aerosolisation. Avoid general anaesthesia unless absolutely necessary for standard indications. Consider plans for the management of a failed regional technique. Local policies for the type of anaesthesia used for Category 1 delivery may need to be reviewed for these cases.

General anaesthesia for caesarean section is associated with a high risk of aerosolisation. Only essential staff should be present and all should wear aerosol generating procedure (AGP) PPE for intubation and extubation. When there is potential need to convert from neuraxial to general anaesthesia in a category 1 section, all theatre staff should wear AGP PPE.

Consider guidance from: [https://icmanaesthesiacovid-19.org/obstetric-anaesthesia-guidance](https://icmanaesthesiacovid-19.org/obstetric-anaesthesia-guidance)
**Investigation therapies for COVID-19: Use in pregnancy and lactation**

Based on the limited available evidence, the clinical characteristics of COVID-19 pneumonia are similar for pregnant and non-pregnant adult patients of similar age. At present, the approach to prevention, evaluation, diagnosis, and treatment of pregnant women with suspected COVID-19 infection should be similar to that in non-pregnant individuals.

Consideration of the safety of all medicinal products used during pregnancy, including for the management of COVID-19 infection, is essential. Treatment should only be initiated with multidisciplinary input from relevant Specialities, including Infectious Diseases / Microbiology / Obstetrics, and Pharmacy advice should be sought on this as well as on available products, choice of agent, and potential drug-drug interactions.

There are several medicinal agents under investigation for use in COVID-19 infection. The following is a summary of the information available for their use in pregnancy and lactation and is designed to complement the HSE national guidance on their use.

More detailed information on their use in pregnancy and lactation is available on Brigg’s Pregnancy and Lactation via the medicinescomplete package on HSE networks and via Athens.

1. **Specific Antiviral Therapies**


<table>
<thead>
<tr>
<th>Medication</th>
<th>Use in Pregnancy</th>
<th>Use in Breastfeeding*</th>
<th>Infant monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hydroxychloroquine (oral)</strong> Day 1: 400mg TWICE a day. Then Days 2-5: 200mg TWICE daily (total duration 5 days)</td>
<td>Used in the management of rheumatic conditions in pregnant women. The limited published data relating to the use of hydroxychloroquine during human pregnancy do not indicate that the drug poses a significant risk to the fetus at this dose.</td>
<td>Compatible with breastfeeding.</td>
<td>Irritability, insomnia, vomiting, diarrhoea, weight gain.</td>
</tr>
<tr>
<td><strong>Lopinavir/ritonavir (Kaletra®) (oral)</strong> 400mg/100mg TWICE daily up to a maximum of 14 days.</td>
<td>Used for the treatment of HIV during pregnancy, where the benefits of treatment considered to outweigh the risk. The human pregnancy experience with lopinavir/ritonavir combination, suggests that the embryo-fetal risk is low. Liquid preparation should be avoided in pregnancy due to propylene glycol and alcohol content, use tablets.</td>
<td>Limited human data as breastfeeding is contraindicated in women with HIV, the usual indication for Kaletra®, in developed countries. Kaletra® is used for the treatment of HIV in infants ≥14 days. The dose received via breastmilk is a fraction of the infant treatment dose, so it is reasonable to not suspend breastfeeding during this short maternal treatment course.</td>
<td>Vomiting and diarrhoea.</td>
</tr>
</tbody>
</table>
**Remdesivir**  
(intravenous)  
200mg once daily on Day 1, then 100mg ONCE daily from day 2 - 10.  
Limited human experience. Used for treatment of Ebola in pregnant women. While case fatality rate of 50% in Ebola makes for a higher tolerance for adverse effects compared to COVID-19, it seems reasonable not to exclude seriously ill pregnant women from access to this therapy.  
Pregnant women are one of the groups eligible for access under individual compassionate use grounds.  
No data available.  
As mechanical ventilation is a key inclusion criterion to access Remdesivir, it is reasonable to assume breastfeeding would not be considered during the treatment period.

*information provided for well, term infants. In preterm or unwell infants consult with Consultant Neonatologist.

The EMA have recently published guidance on the compassionate use of Remdesivir.  

2. **Tocilizumab**

Full guidance available on HSE guidelines Interim Recommendations for the use of Tocilizumab in the Management of Patients who have Severe COVID-19 with Suspected Hyperinflammation.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Use in Pregnancy</th>
<th>Use in Breastfeeding*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tocilizumab</strong></td>
<td>Limited human experience. In the small number of exposures reported no teratogenic effects have been noted.</td>
<td>Limited data available. Only small amounts of tocilizumab were detected in breastmilk after intravenous doses in several mothers. In the few reported cases, breastfeeding has resulted in undetectable infant serum levels and no reported adverse effects. If tocilizumab is required by the mother, it is not a reason to discontinue breastfeeding. <strong>Infant monitoring:</strong> Fever, diarrhoea, weight gain, frequent infections.</td>
</tr>
<tr>
<td>(intravenous infusion)</td>
<td>8mg/kg (max 800mg) as single dose One additional dose may be considered 8-12 hours later if clinical symptoms worsen or there is no improvement (max 2 doses per course)</td>
<td></td>
</tr>
</tbody>
</table>

*information provided for well, term infants. In preterm or unwell infants consult with Consultant Neonatologist.

3. **Other Medications**

**Analgesics**

Paracetamol should be used first line for the management fever or pain symptoms in COVID-19 infection. Women taking NSAIDs for other conditions, who develop COVID-19 infection, do not need to interrupt their treatment and for postnatal patients, NSAIDs, can be included as a component of multimodal postnatal analgesia.  
Further information is available from the HSE and EMA.
Antibiotics
National or local obstetric antimicrobial guidelines for community acquired pneumonia or hospital acquired pneumonia can be followed when antibiotics are required in women with COVID-19. More information on antimicrobial use during COVID-19 is available from the Health Protection Surveillance Centre (HSPC).

Mucolytics
Mucolytics such as Carbocisteine used to aid mucus clearance in patients with COVID-19 are not recommended for use in women in the first trimester. Carbocisteine is compatible with breastfeeding.

4. Bibliography


WHO Guidelines for the management of pregnant and breastfeeding women in the context of Ebola virus disease accessed on 30/03/20 https://apps.who.int/iris/bitstream/handle/10665/330851/9789240001381-eng.pdf
Specific circumstances

ART

In view of the published information and evidence about SARS-CoV2, and the maternal and neonatal outcomes reported in cases of other coronavirus infections (such as SARS-CoV), the European Society for Human Reproduction and Embryology (ESHRE) initially recommended a precautionary approach.

"In line with the position of other scientific societies in reproductive medicine such as the American Society for Reproductive Medicine (ASRM), ESHRE advise that all fertility patients considering or planning treatment, even if they do not meet the diagnostic criteria for COVID-19 infection, should avoid becoming pregnant at this time. For those patients already having treatment, they suggest considering deferred pregnancy with oocyte or embryo freezing for later embryo transfer. ESHRE further advises that patients who are pregnant or those (men and women) planning or undergoing fertility treatment should avoid travel to known areas of infection and contact with potentially infected individuals."

ESHRE reaffirmed that all medical professionals have a duty to avoid additional stress to a healthcare system that in many locations is already overloaded.

In an updated statement on April 2nd, ESHRE reiterated that “since many uncertainties remain about the effects of SARS-CoV-2 infection on ART and pregnancy, and despite different approaches among treatment centres and countries, ESHRE currently considers any risk too high when similar treatments can be performed at a later date.” The society stated that: healthcare professionals and clinics should remain available to provide supportive care, psychological support and clinical advice to their patients, preferably via online consultation.

Subsequently, the ESHRE COVID-19 working group prepared and published the “ESHRE Guidance on recommencing ART treatments”, a set of recommendations for centres planning to restart ART treatments.

https://www.eshre.eu/Press-Room/ESHRE-News#COVID19_April2

The British Fertility Society (BFS) have issued similar guidance and state they expect all centres to stop initiating new fertility treatments, including In-Vitro Fertilization, frozen embryo transfer, surgical sperm retrieval, insemination and ovulation induction. This statement also comments that: “maintaining contact with patients whose treatment has been disrupted or deferred is important, and consideration should be given to prioritisation when services are able to recommence”.


On 1 May 2020, the BFS issued a position statement on the resumption of fertility treatment in the UK during the COVID-129 pandemic. Best practice guidelines are awaited.


The UK’s Human Fertilisation and Embryology Authority (HFEA) issued a mandatory ‘General Direction’ which required all clinics to have a COVID-19 treatment strategy in place and to have stopped all treatments by 15 April 2020.

On 1 May 2020, the HFEA announced that in the week commencing 11 May, fertility clinics could apply to reopen, once revised General Directions have been issued.


Abortion care

Abortion is an essential component of comprehensive health care. It is also a time-sensitive service for which a delay of several weeks, or in some cases days, may increase the risks or potentially make it completely inaccessible. The consequences of being unable to obtain an abortion profoundly impact a person’s life, health, and well-being.

"The American College of Obstetricians and Gynecologists and the American Board of Obstetrics & Gynecology, together with the American Association of Gynecologic Laparoscopists, the American Gynecological & Obstetrical Society, the American Society for Reproductive Medicine, the Society for Academic Specialists in General Obstetrics and Gynecology, the Society of Family Planning, and the Society for Maternal-Fetal Medicine, do not support COVID-19 responses that cancel or delay abortion procedures. Community-based and hospital-based clinicians should consider collaboration to ensure abortion access is not compromised during this time."

https://www.smfm.org/covid19

The Royal College of Obstetricians and Gynaecologists have issued information for healthcare professionals on abortion care. They state that as Abortion care is an essential part of health care for women: services must be maintained even where non-urgent or elective services are suspended. Further that attention should be paid to providing care as early as possible given gestational limits, and that delays should be minimised.


In Ireland, a revised Model of Care for termination in early pregnancy was issued by the HSE, NWIHP and the Department of Health on the 6th April (the document has been circulated but is not yet available on any HSE or DoH website). This document provides for remote consultation with a medical practitioner for the purposes of accessing termination in early pregnancy. Where a medical practitioner judges it to be clinically necessary, a face-to-face consultation may be held with the patient; however, the document states that such consultations should be kept to a minimum during the COVID-19 public health emergency.

Pregnancy loss

In this unprecedented time of the SARS-CoV2 pandemic, the diagnosis, investigation and management of pregnancy loss should continue as much as possible in accordance with the National Standards for Bereavement Care following Pregnancy Loss and Perinatal Death. Isolation and infection control policies associated with COVID-19 infection should be applied in pregnancy loss situations with a risk/benefit analysis and evidence base so that staff can continue to provide the highest standard of compassionate supportive care.

All bereavement services should continue to be available to parents in so far as possible.
The following areas should be borne in mind:

**Isolation:**

Pregnancy loss is an isolating experience in itself and this can be further compounded with heightened visitor restrictions during COVID-19. The importance of the presence of a partner/support person during what is finite time should be protected (unless a partner is confirmed or suspected COVID-19 positive). Where a mother is COVID-19 positive, the use of PPE should be in accordance with current guidelines.

**Making memories:**

In keeping with the National Bereavement Standards and pathways parents must be supported to have the opportunity to care for their baby and to make all the memories possible but in a clinically safe way for parents and healthcare professionals.

Staff need to afford parents every opportunity to make memories with their baby; these include: creating mementos, taking photographs, seeing and holding their baby, providing the *Feileacain* memory box, participating in spiritual /religious /cultural rituals and customs. Additional opportunities to create virtual visiting (using video calls/ video recordings) and memory making in accordance with the expressed wishes of parents may be necessary to include siblings and wider family members who will not be able to visit the hospital. Obviously, in this scenario, and assuming the mother is not critically ill, the baby should be allowed to stay in the room with the mother as is usual practice.

**Postnatal/ Post discharge support:**

Informed by public health guidelines, changes to funeral/ cremation arrangements may be necessary. While this is distressing it is important to capture as many moments and memories of this time to share with family later.

Postnatal care and support should continue to be provided. Parents should be given the appropriate contact numbers for ongoing support following discharge from hospital which should include written information for hospital supports and national support networks.

Consideration needs to be given to rearranging Pregnancy Loss Clinic appointments to take place on the telephone - particularly where there are time-sensitive issues about results of investigations or future pregnancy considerations to be discussed.

https://www.hse.ie/eng/services/list/3/maternity/bereavement-care/


www.pregnancyandinfantloss.ie
Currently HSE services for women opting for homebirth in Ireland are provided by Self Employed Community Midwives (SECM) via a Memorandum of Understanding (MOU) and Agreement dated 2014 (HSE, 2018). Governance for HSE homebirth services lies with Primary Care (HSE, 2018). Community midwives employed by the acute maternity hospitals also provide Homebirth services and the services provided by these community midwives are under the governance of the relevant hospital i.e the National Maternity Hospital, University Hospital Waterford and Wexford General Hospital.

The HSE MOU has as its guiding principle the; (1) identification of safe, acceptable and feasible options of maternity care, which are women-centred, facilitate choice and continuity of care and which promotes partnerships and supports professionals involved in the service delivery; (2) Homebirth is a safe option for pregnant women; and (3) a safe outcome for mother and baby is paramount.

The COVID-19 pandemic brings with it unprecedented challenges and SECMs, Designated Midwifery Officers (DMOs), Community Midwives and Directors of Midwifery are required to adapt provision of care in line with national HSE and HSPC COVID-19 recommendations.

Recent guidance produced by the Royal College of Midwives (RCM) and informed by a rapid review (Renfrew et al, 2020) was developed to support maternity care leaders in decision making about midwife-led birth settings in the evolving pandemic (RCM/RCOG, 2020).

The following adjustments to HSE Homebirth services during the COVID-19 pandemic apply:

**For all women**

- Planned homebirths continue as a choice for healthy normal risk women who meet the eligibility criteria for HSE Homebirth services or those criteria identified by the individual maternity hospitals with community midwifery services.
- Provision of routine antenatal care should continue and remote/virtual consultations should be considered (see routine antenatal care)
- Provision of the homebirth service will depend on the availability of the SECMs (including second midwife) or in the case of community midwifery services –sufficient midwives deployed in the community.
- Provision of the homebirth service will also depend on the availability of the ambulance service to provide emergency transfer if required. Regular communication between the SECMs/community midwives and the National Ambulance Service (NAS) should be maintained to assess ambulance availability. It is important to note that the rate of transfer of primagravid women is much higher than for multiparous women.
- The SECM/community midwife should make all women booked for home birth aware about the impact of reduced midwifery staffing and/or ambulance availability on provision of a safe homebirth service, to prepare them in advance for any interruption to the homebirth service during the pandemic and need to transfer care to the hospital setting.
- SECM /second midwife/community midwife should follow the HSE COVID-19 guidance on social distancing while in the home and if possible community midwifery staff should aim to keep separate from midwifery staff in the hospital to reduce risk of transmission between staff.
- Standard PPE precautions apply (See PPE) [https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/](https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/)

Prior to any home visits: the SECM/community midwife should contact the woman by phone to ascertain if the planned home visit is safe to proceed.
The SECM/community midwife should ask the woman if they or any member of their household have:

- Recent onset of fever or chills and signs and symptoms of respiratory tract infection which includes cough or shortness of breath
- Been in contact with a person confirmed with COVID-19;
- Been advised by a public health doctor or GP to self-isolate.

The SECM/community midwife may ask the above questions again before entering the home, to check if the situation has changed. If the answers are all no, then the planned visit should go ahead and all standard precautions taken. (See PPE)

If the visit has to be postponed or delayed the SECM/community midwife should reassure the woman of her plans to reorganise care and re-emphasise to the woman, the importance of continuing with routine antenatal care and monitoring of baby’s movements. All discussions are documented in the woman’s domiciliary midwifery notes (and the national maternity healthcare record if available).

**For women with suspected or confirmed COVID-19 infection**

- The SECM/community midwife should advise the pregnant woman to follow the HSE/HSPC guidance as outlined and refer the woman to the associated maternity unit.
- An Obstetric consultation with the pregnant woman should take place that outlines all potential risks including the increased risk of fetal compromise in the active phase of labour if infected with COVID-19 (RCOG, 2020); the SECM/community midwife should attend this consultation either in person or by telephone.
- Hospital birth is recommended for those women who are COVID-19 positive close to term or for whom delivery is recommended during the illness.
- A key recommendation that should be discussed and explained to the woman is regarding attending an Obstetric unit for birth, and where the baby can be monitored using continuous electronic fetal monitoring (EFM) (RCOG, 2020; JOG, 2020).
- The unit staff with the woman will put a management plan in place for the rest of pregnancy and the birth. This plan will be determined by the gestation of the pregnancy and the severity of the woman’s illness, as well as recommendations around timing of birth or the need for ongoing antenatal surveillance such as ultrasound scans.
- The SECM/community midwife is to be notified of the plan as it may include referral back to the homebirth services if the woman does not test positive for COVID-19 infection or after she has recovered from her illness if positive for COVID-19.

**References**


This section was prepared by Margaret Quigley (HSE; ONMSD), with contributions from Ann O’Byrne (DMO, Lead) and Michelle Waldron (NMPDU Officer/DMO), and was reviewed by representatives from the SECMs, DMOs, Directors of Midwifery and HSE Primary Care, as well as NWIHP.
## Neonatal care considerations

### Baby of suspected/positive COVID-19 mother

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<th>Aspect</th>
<th>Consideration</th>
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| **Risk assessment**          | • Maintain high index of suspicion for signs of sepsis/unwell baby  
• As babies are known to be significant shedders of respiratory viruses, a confirmed COVID-19 positive baby requires full infection control precautions (including stools) |
| **Neonatal care in birthing suite** | • Assign a dedicated neonatal team member to attend the birth but only according to usual clinical indications  
• If neonatal stabilisation/resuscitation required in the birthing room/theatre, use full PPE. Neonatal team can remain outside in PPE until the baby is delivered.  
• Where feasible, transport baby between locations in the facility in a closed system  
• If required, plan to transfer to a designated isolation area in the neonatal unit (NNU)  
• Transfer baby to NNU on resuscitaire with staff in PPE if baby unwell  
• In the NNU, the baby should be nursed in an isolette |
| **Respiratory support**      | • High risk activities  
  o Those associated with aerosolisation require full PPE use  
  o This includes intubation/IPPV with Neopuff/BIPAP/CPAP/HFNC  
  o Intubation and less invasive surfactant administration  
    ▪ Use in-line suction with endotracheal tubes if possible  
    ▪ Consider where feasible Videolaryngoscopy  
• Where feasible, nurse babies requiring respiratory support in an incubator |
| **Neonatal testing**         | • No indication to test well asymptomatic baby  
• Case definition: newborns may not show all the features of an influenza-like illness, e.g. a fever, so clinicians should have a high index of suspicion in all babies admitted to the NNU and monitor for signs of respiratory illness during the admission.  
• Symptomatic babies that meet the definition only by virtue of requiring respiratory support for an anticipated non-COVID-19 respiratory pathology (e.g. RDS), should be tested after 72 hours of age – to avoid potential early false negative results.  
  o It is suggested to test again on day 5 before declaring non-infected.  
• Collect nasopharyngeal and oropharyngeal swab (single swab both sites)  
• Undertake subsequent testing as indicated  
  o e.g. if baby becomes unwell, after maternal negative result, or as recommended by infectious disease team  
• SARS-CoV2 swabs on any baby to be agreed at Consultant level. |
| **Admission to nursery**     | • COVID-19 positive mother (i.e. no other neonatal criteria), is not itself an indication for admission to a neonatal unit  
• Perform clinical assessment after birth as per usual protocols  
• Assess if required care can safely be provided during co-location with mother (preferred option)  
• Follow usual clinical criteria, processes and protocols relevant to admission |
**Neonatal surveillance**

- Maintain high index of suspicion for signs of sepsis/unwell baby
- Provide post discharge advice about indications for readmission and possible course of disease
  - Most commonly reported are respiratory symptoms requiring readmission 1–3 weeks after discharge
  - Delay routine follow-up as required (e.g. hearing screen)
- Readmission to Paediatrics units to keep infected infants away from the immunocompromised NNU population.


**Delivery (Appendix 4)**

The neonatal team should be informed of plans to deliver the baby of a woman affected by moderate to severe COVID-19 infection, as far in advance as possible and should also be given sufficient notice at the time of birth, to allow them to attend and don PPE before entering the room/theatre. However, COVID-19 infection in the mother is not *per se* an indication for the neonatal team to routinely attend delivery.

A designated member of the neonatal team should be assigned to attend suspected/confirmed COVID-19 deliveries, if this is clinically necessary. It is important that the most senior person likely to be required attends in the first instance, to minimise staff exposure. Units might chose to establish a dedicated COVID Neonatal Team with dedicated Registrar and Consultant during working hours. Local units should make their own arrangements for designating staff, but senior involvement is expected.

PPE should be donned in an adjacent room and the team member should wait outside the delivery room, ready to be called in should the baby require any intervention(s). If it is anticipated that the baby will require respiratory support, appropriately skilled neonatal team members should be present at delivery and wearing PPE.

Neonatal resuscitation/stabilisation should proceed as per guidance. If additional equipment is required, this can be passed to the team by a ‘clean’ staff member outside the room. Neonates should be transferred in a closed incubator, although where the baby is unwell they may need to be transferred by resuscitaire (with staff in full PPE). Where possible, all procedures and investigations should be carried out in the single room or in an isolation room/bay with a minimal number of staff present.

There is no evidence to suggest that antenatal corticosteroids for fetal lung maturation cause any harm in the context of COVID-19, except perhaps where the pregnant woman has a critical illness in which case a multidisciplinary discussion needs to determine their relative benefit. Steroids should therefore be given to mothers anticipating preterm delivery where indicated and urgent delivery should not be delayed for their administration.

Magnesium Sulphate (MgSO4) should be given for neuroprotection of babies <32 weeks’ gestation as per current guidance.

Regarding neonatal management of suspected, probable and confirmed cases of maternal COVID-19 infection, the umbilical cord should be clamped and the neonate should be transferred to the resuscitation area for routine assessment and if appropriate assessment by the attending neonatal team.

There is insufficient evidence regarding whether delayed cord clamping (DCC) increases the risk of infection to the newborn via direct contact. In units in which delayed cord clamping is usually recommended, clinicians should consider whether this practice should be continued.
The most recent RPCH/BAPM/RCOG guidance clearly states that deferred cord clamping is still recommended provided there are no other contraindications. The baby can be dried as normal while the cord is still intact. In the case of a preterm baby, standard thermoregulatory measures including the use of a plastic bag should also be used.

Whether DCC is practiced or not, the neonate should be transferred after delivery to the resuscitaire for initial assessment by the attending midwife, or by the neonatal team as appropriate for the circumstances at delivery. An immediate skin to skin approach with the COVID-19 infected mother should not take place; this can be considered later with the mother alongside appropriate hand hygiene and sterile PPE precautions.

In view of the current uncertainty regarding vertical transmission, consideration can be given to bathing of the baby after delivery and cleaning/washing of the eyes with saline, in order to remove maternal surface blood body fluids and minimise risk of entry to infant mucosal sites/mouth/nose.

Asymptomatic well babies should not be admitted to the neonatal unit (NNU). Babies of COVID-19 positive mothers who need admission to the NNU for any reason should be isolated, and managed in their own isolette in a designated isolation area, with dedicated staffing.

**Rooming-in and Infant feeding**

Given the current lack of information, it seems reasonable to assume that a newborn from a mother with COVID-19 infection at delivery could possibly be infected, either in utero or perinatally, and thus should be placed in isolation to avoid exposure to other newborns.

However, well term/near-term babies, not otherwise requiring neonatal unit care, should stay with their mother, if at all possible. If the mother is severely or critically ill, separation may then be necessary and will be reviewed on an individual case basis. Maternal illness is not in itself an indication for newborn admission to the NNU, so the baby may be cared for in an isolette in the nursery (where available) or in isolation with the mother e.g. on a COVID-19 assigned ward. It is recommended that the baby is cared for at home if the mother is admitted to an Acute Adult Hospital so as to reduce the risk of infection to the baby.

In light of the current evidence, the benefits of breastfeeding outweigh any potential risks of transmission of the virus through breastmilk.

If the woman is asymptomatic or mildly affected, breastfeeding and rooming-in can be considered by the mother in coordination with healthcare providers. Breastfeeding can still be encouraged through supporting mothers who have been separated from their baby to express milk (EBM). Either way, mothers should have a designated breast pump for exclusive use and local infection control policies should be consulted in the cleansing of this.

Whether COVID-19 can be transmitted through breastmilk is unknown. Since the main concern is that the virus may be transmitted by respiratory droplets rather than breastmilk, breastfeeding mothers should ensure to wash their hands and wear a three-ply surgical face mask before touching the baby. Similarly, mothers should wear a face mask and wash hands, before touching breast pump or bottles, as well as avoid coughing or sneezing on the baby while feeding.

In case of rooming-in, the baby’s cot should be kept at least 2 meters from the mother’s bed, and a physical barrier such as a curtain may be used. An incubator can also be used in the room as a physical barrier.

Babies requiring subsequent additional care (e.g. intravenous antibiotics) should be assessed in the delivery suite or postnatal wards and a decision made as to whether additional care can safely be provided at the mother’s bedside. NNU admission should be avoided if at all possible and safe.
Any need to separate mothers with COVID-19 infection from their newborns, with the consequence that they are unable to breastfeed directly, may impede early bonding as well as establishment of lactation. These factors will inevitably cause additional stress for mothers in the postpartum period. As well as caring for their physical wellbeing, medical teams should consider the mental wellbeing of these mothers, showing appropriate concern and providing support when needed (RCOG/RCM, 2020).

The Neonatal Paediatric COVID-19 guidance group have issued recommendations for breastfeeding during the Covid-19 pandemic. These state that the HSE and Faculty of Paediatrics encourage breastfeeding to protect children and reiterate that “the benefits of breastfeeding outweigh the potential for exposure to the virus”.


**Testing**

There is currently no clinical indication to test any well baby born to a COVID-19 positive mother. Performing nasal swabs on asymptomatic infants may also result in false negatives, and the optimal timing of testing in any case is unclear.

Asymptomatic patients, including infants, even if positive, are unlikely to transmit the virus, providing everyone adheres to basic hygiene measures. Viral RNA may be detectable in stools for several weeks, but this does not mean that the faecal material is necessarily infective; providing carers adhere to basic hygiene measures, the risk is not thought to be significant.

Asymptomatic babies should not be routinely admitted to the NNU. If subsequently admitted for other issues such as jaundice /hypoglycaemia they do not require testing unless their symptoms fit the case definition (HSPC).

Newborns may not show all the features of an influenza-like illness, particularly a fever, so clinicians should have a high index of suspicion in all babies admitted to the NNU and monitor for signs of respiratory illness during the admission (RPCH / BAPM).

Babies of COVID-19 positive mothers who need admission to the NNU for any reason should be isolated, and managed in their own isolette in a designated isolation area, with dedicated staffing. They must be monitored for signs of COVID-19 during their admission. If they develop signs, they should then be tested.

Symptomatic babies that meet the definition only by virtue of requiring respiratory support for an anticipated non-COVID-19 respiratory pathology (e.g. RDS), should be tested after 72 hours of age – to avoid potential early false negative results. It is suggested to test again on day 5 before declaring them non-infected.

Babies can come out of isolation despite continuing need for respiratory support, providing the tests on day 3 and 5 are negative, and the baby is following the projected clinical course (e.g. expected for RDS, etc.).

If there is clinical concern that a baby who meets the case definition or who has been in isolation is not following a typical clinical course for an anticipated non-COVID-19 respiratory pathology, they should be tested that day.

Known COVID-19 positive babies should be isolated until their symptoms resolve and they no longer need respiratory support; they can then be allowed out of isolation but must remain in an incubator and monitored for respiratory signs and symptoms for a further 14 days.

Babies awaiting test results and <7 days of age can be cohorted in the same isolation room, provided they remain in incubators, as airborne transmission (with the exception of aerosol...
generating procedures) is not currently thought to be a major mechanism of transmission in this clinical context.

Clinical investigations should be minimised whilst maintaining standards of care. Senior input is recommended when deferring routine investigations and in prioritisation of work.

**Procedures in the NNU**

In the absence of evidence, it is reasonable to treat the baby’s respiratory illness in the same way as if they were not potentially exposed to COVID-19. The evidence in favour of early intubation is limited to adults and older children. All babies requiring respiratory support should be nursed in an incubator.

Intubation is an aerosol generating procedures (AGP), although the risk of transmission soon after birth is thought to be low; however it is recommended that staff follow their local guidance regarding use of appropriate PPE, even in an emergency. In-line suction with endotracheal tubes should be used, where possible.

Where possible, use of a video-laryngoscope should be considered for intubation, which might facilitate keeping the baby within the incubator. By reducing proximity to the baby’s airway this may help to reduce exposure to the virus. Intubation should only be undertaken by staff with appropriate competencies.

CPAP and high flow therapies are also associated with aerosolisation, and staff caring for infants receiving these therapies must also adhere to their local guidance regarding use of appropriate PPE.

**Policies in the NNU**

Transfers should be limited to a minimum, and as per network escalation policies. Exposure to COVID-19 in itself is not a reason to transfer.

All staff must adhere to the locally recommended PPE guidelines before entering an isolation room. A register must be kept of all staff entering isolation rooms. All equipment coming out of the isolation room should be cleaned.

It is anticipated that NNU capacity may become problematic either due to cot capacity or staff availability. Individual units should have agreed staffing plans when optimal staffing plans cannot be achieved. Cohorting of confirmed positive cases may be necessary and should follow local guidance.

COVID-19 positive mothers should not visit their baby on the NNU, until they are asymptomatic (14 days since developed symptoms and no temperature for the last 5 days.) or have tested negative, where this testing is available. Partners of COVID-19 positive mothers must adhere to the current advice regarding self-isolation, and the hospital policy regarding visiting the maternity wards and NNU, except under exceptional circumstances. These policies may vary across units, according to the level of the outbreak and NNU configuration; units are therefore encouraged to provide updated and accessible information regarding visiting for mothers and accompanying partners.

**Newborn screening**

Newborn Infant Physical Examination (NIPE) – this should be completed as usual in hospital, prior to discharge. Newborn Blood Spot (NBS) screening should take place as usual.

Audiology screening should continue in maternity units and on the NNU. The ability to perform investigations and tests once the infant has left hospital will be restricted – e.g. newborn hearing screening in the community, bringing infants back for echocardiograms, etc. Thus,
where possible, investigations and tests should be performed before discharge from the maternity or neonatal unit.

Maternity units should aim to maintain sufficient staffing in order to perform the necessary screening before discharge.

**Discharge home**

When baby and mother are ready for discharge, they should be provided with written advice regarding what to look out for, in terms of respiratory symptoms, lethargy or poor feeding, and from whom to seek further advice should they have concerns. They should be advised to self-isolate for 14 days.

All measures aimed at early discharge from the NNU should be scaled up, where possible.

Consider telephone / video consultations for neonatal follow up, where possible, to avoid vulnerable infants with chronic lung disease, etc., attending clinics.

Advice should be provided to parents of those infants at increased risk (e.g. immunocompromised, chronic lung disease, cardiac disease) about reducing risk of infection (reduce social contact, handwashing) and interventions aimed at preventing other diseases (e.g. immunisations) should be optimised.

Parents who telephone NNUs for help should receive experienced advice, with the aim of minimising direct contact with either neonatal or paediatric services.
11 Perinatal Pathology Considerations

SARS-CoV-2 is regarded as a hazard group 3 (HG3) organism by the UK Health and Safety Executive Advisory Committee on Dangerous Pathogens, with consequent implications for if, where and how autopsy examinations may be undertaken.

https://www.hse.gov.uk/pubns/misc208.pdf

Current COVID-19 related autopsy protocols refer to the infected or potentially infected patient and would be applicable for COVID-19 related maternal deaths. They do not deal with the specific scenario where an autopsy is being considered on the miscarried or stillborn infant of an infected mother. In this scenario the risk to hospital staff of infection is poorly understood but at a minimum, apart from considerations around reported instances of possible vertical transmission, there is a risk of infection from fomite contamination of the surface of the infant or of its wrappings following delivery.

Impact on current services

Staffing levels in histopathology laboratories may be affected through illness or staff redeployment. Mortuary staff may be particularly affected through having to handle and process bodies, from either the hospital or community, where COVID-19 infection is known, suspected or unknown. As this necessary processing of bodies may become onerous there is potential for impact on the nature of autopsy services that a particular mortuary may be able to safely offer.

Only certain mortuaries in the country have the infection control facilities that would enable them to support autopsies in COVID-19 positive cases. Nationally, some transportation to these facilities may be required in certain Coroner-directed autopsies or State Pathologist autopsies.

Limited autopsy protocols

During the current COVID-19 pandemic, autopsy practice involves making a risk assessment on a case by case basis.

A number of guidelines now exist to guide practice on handling deceased persons and autopsy practice: RCPath Briefing on Autopsy practice relating to possible cases of COVID-19; Draft Faculty of Pathology (Ireland) recommendations for post mortem practice in COVID-19; HSE/HPSC National Interim Guidelines for Funeral Directors on managing infection risks when handling deceased individuals with confirmed COVID-19 and Notice to Fellows: Update on Swabbing for COVID virus and related issues 24 April 2020.


https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/funeraldirectorsguidance/

http://www.coroners.ie/en/COR/

In brief, if a patient is known to be COVID-19 positive and dies and a medical certificate of death may be issued, an autopsy will not be performed. An autopsy will only proceed in a COVID-19 positive case only in very limited scenarios, often for legal purposes.

According to Faculty of Pathology guidance “no open cavity post-mortem should be undertaken without performing a COVID -19 swab first, during this pandemic time period”. With the agreement of Coroners nationally other practices are being modified to reduce the burden on pathologists/mortuaries during this time.
**PM for the infected infant / POC examination in infected cases**

Three main forms of pathological examination are carried out for the maternity services in a setting of COVID-positive mothers.

1) **Examination of products of conception (from 1st trimester miscarriage):**

   Appropriate safety precautions need to be taken during the collection of these specimens. The tissue should then be placed in formalin for fixation and sent to the pathology laboratory labelled with clinical details including COVID-19 status. The specimen should then be fixed for a minimum of 24 hours before examination to minimise the risk of infection for laboratory staff. The taking and sending of fresh samples for purposes such as cytogenetic analysis may pose an unwarranted risk of infection at this time and should be discussed with the relevant laboratory before being sent.

2) **Examination of placentas:**

   Appropriate safety precautions need to be taken during the collection of these specimens. Laboratories that store placentas fresh for later potential examination should re-evaluate their safety protocols in view of the recommendations on handling of fresh tissue (e.g. for frozen section) in the context of SARS-CoV2. Placentas to be examined pathologically should be placed in formalin for fixation and sent to the pathology laboratory labelled with clinical details including COVID-19 status. The specimen should then be fixed for a minimum of 24 hours before examination to minimise the risk of infection for laboratory staff. The taking and sending of fresh samples for purposes such as cytogenetic analysis may pose an unwarranted risk of infection at this time and should be discussed with the relevant laboratory before being sent.

3) **Post mortem examinations:**

   All perinatal post mortem examinations will now necessarily involve COVID-19 swabbing of the mother or infant or both.

   Each institution should have an agreed protocol for same to ensure that bereavement care is not unnecessarily compromised.

   An example of the processes involved is suggested below for assistance:

   **For Intrauterine demise / Termination of pregnancy:**

   1. At the time of administration of Mifepristone for medical management of intrauterine demise or termination of pregnancy, a maternal COVID-19 swab should be taken.
   2. The doctor who takes the swab should discuss the case with the microbiology laboratory indicating that it is for post mortem purposes.
   3. The Perinatal Pathologist should be informed that a COVID-19 swab has been taken and when the result will likely be available.
   4. The midwifery / duty manager should be informed of the case and that a COVID-19 swab has been taken.
   5. Since this swab is taken as a screening test, there is no indication to isolate the mother and staff do not need to wear additional PPE.

   **Intrapartum demise / Neonatal death:**

   1. For cases of intrapartum death after 24 weeks or early neonatal death at any gestation, a COVID-19 swab must be taken from the baby.
   2. Consideration should be given to taking a maternal COVID-19 swab also in these cases.
   3. Steps 2-5 above should then be followed
Where a mother is COVID-19 positive or where there is a suspicion of infection:

These cases must be the subject of urgent senior level MDT discussion with the Perinatal Pathologist, and Coroner if necessary. A staged approach to pregnancy loss investigations is necessary and should be discussed with the local pathologist as each case arises. For earlier pregnancy losses, where an autopsy is being considered (second trimester), it may be possible to place the fetus in formalin fixative to reduce the risk of infection. While this would delay the examination, the fetus may be returned to its parents after the autopsy.

For later gestations consideration should be given to the necessity for a full autopsy examination in order to minimise exposure of staff to the risk of infection (including within radiology and the mortuary/pathology departments). Results of any prior anomaly scan, basic bed-side measurements, Kleihauer tests, placental examination etc. may provide the information required to formulate a cause of death without need for a full autopsy. Consideration of microbiological sampling of the infant/neonate for COVID-19 (nasopharyngeal/anal swabs; cord blood for serology) may be discussed with the local microbiology department. Needle biopsies of key organs (lung, liver, heart) may provide information in certain circumstances and may be performed on the ward, again reducing the necessity for a full autopsy.

Due to the complexity of the issues involved particularly with the potential for involvement of the Coroner’s office, case by case evaluation of these cases is mandated.

Any COVID-19 swabs taken for the purposes above should be labelled “urgent: for post-mortem decision making” or similar to ensure urgent hospital processing.

Due to the complexity of the issues involved, particularly with the potential for involvement of the Coroner’s office, case by case evaluation of these cases is mandated along with early discussion with the Pathologist.
12 Personal Protective Equipment (PPE)

Please visit the below link for all up to date guidelines regarding PPE: https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/

This section is to be used in conjunction with: https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/

As well as the complete Infection Prevention and Control Guidance for COVID-19: https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/

This document provides maternity services specific suggestions.

- Designate a member of the management team to take responsibility for PPE
- Senior management agree a team to manage PPE stock within the hospital/unit.
- Create a log of supplies
- Senior hospital mangers to be aware of how to access/procure PPE at all time
- Ensure stock levels are maintained by enforcing appropriate use of PPE
- Ensure appropriate level of PPE is being used for all procedures
- Provide training for all staff in the use of PPE
- Educate staff on PPE use
- Place information in public areas in the hospital to raise awareness of PPE use

PPE Jargon Buster

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRSM</td>
<td>fluid resistant surgical mask</td>
</tr>
<tr>
<td>FRDG</td>
<td>fluid resistant disposable gown</td>
</tr>
<tr>
<td>PPE</td>
<td>personal protective equipment</td>
</tr>
<tr>
<td>AGP</td>
<td>aerosol generating procedure</td>
</tr>
<tr>
<td>FFP2</td>
<td>filtering face piece level 2 mask</td>
</tr>
</tbody>
</table>

Use of Surgical Masks

On April 21 2020, National Public Health Emergency Team (NPHET) decided that HPSC guidance should be updated in accordance with a NPHET decision on the use of surgical masks. The revised HSPC guidance reflects that NPHET decision and replaces previous HPSC guidance on the use of surgical masks in the context of providing healthcare during the COVID-19 pandemic.

Use of surgical masks by healthcare workers in the context of viral respiratory tract infection has two objectives:

1. To reduce the risk of droplet transmission of infection to the wearer.
2. To reduce the risk of droplet transmission of infection to others.

- Surgical masks should be worn by healthcare workers when they are providing care to people and are within 2 m of a person, regardless of the COVID-19 status of the person.
• Surgical masks should be worn by all healthcare workers for all encounters, of 15 minutes or more, with other healthcare workers in the workplace where a distance of 2m cannot be maintained.

This means that a healthcare worker should don a mask if they anticipate being within 2 m of one or more other healthcare workers for a continuous period of 15 minutes or longer. It is not intended that healthcare workers should attempt to estimate in the morning the total duration of a sequence of very brief encounters that may occur during the day.

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/infectionpreventionandcontrolguidance/ppe/useofsurgicalmasksinhealthcaresetting/

Care of patients with respiratory symptoms/ suspected/confirmed COVID-19


![COVID-19 Safe PPE Diagram](image-url)
PPE for care of women with known or suspected COVID-19 infection in labour

An individual risk assessment should be carried out before/at the time of providing care to determine which scenario applies and when the risk has changed. Here are examples of possible scenarios.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Examples</th>
<th>PPE required</th>
</tr>
</thead>
</table>
| A        | Low risk of splashing of secretions (including respiratory secretions), blood, body fluids or excretions | Routine care including in 1st stage of labour | • Fluid resistant surgical mask  
• Gloves  
• Plastic apron |
| B        | Risk of splashing of secretions (including respiratory secretions), blood, body fluids or excretions | 2nd / 3rd stage of labour  
Vaginal delivery  
Operative Delivery (incl Category 2-4) | • Fluid resistant surgical mask  
• Gloves  
• Long-sleeved fluid repellent disposable gown  
• Eye protection |
| C        | Aerosol generating procedure (AGP) | All Caesarean sections under General Anaesthesia (incl Category 1)  
Includes maternal intubation  
Note the following are not aerosol generating events:  
• heavy exhalation in labour  
• use of Entonox | • Hand Hygiene  
• Disposable Single Use Nitrile Gloves  
• Long sleeved disposable gown  
• FFP respirator mask  
• Eye Protection  

**AGP for mother:** All individuals in the room. Only essential staff in room.  
**AGP for neonate:** The risk that any aerosol generated during neonatal resuscitation would contain clinically significant virus is considered so low that PPE as described in Scenario B is recommended.

Adapted from NHS England
Donning PPE for obstetric anaesthesia

An individual risk assessment should be carried out before/at the time of providing care to determine which scenario applies and when the risk has changed. Here are examples of possible scenarios.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Outside room:</th>
<th>In the room</th>
<th>Theatre</th>
<th>At the end of the case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A Labour epidural</strong></td>
<td>Put on theatre hat, FRSM &amp; eye protection</td>
<td>Perform epidural and ensure it is working</td>
<td>Remove FRSM (avoid touching outside) &amp; hat</td>
<td>Remove FRSM &amp; hat</td>
</tr>
<tr>
<td>Fluid resistant surgical mask</td>
<td>Scrub up</td>
<td>Remove gloves, clean hands with gel</td>
<td>Dispose of in clinical waste bin</td>
<td>Wash hands with soap and water</td>
</tr>
<tr>
<td>Gloves</td>
<td>Put on disposable fluid resistant sterile gown, sterile gloves</td>
<td>Remove gown &amp; turn inside out</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic apron</td>
<td></td>
<td>Remove eye protection.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dispose of all items in clinical waste bin</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gel hands</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B Caesarean delivery</strong></td>
<td>Put on sterile PPE as described, in an area at least 2m away from patient</td>
<td>Ask patient to put on FRSM after cleaning hands with gel</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spinal anaesthesia</strong></td>
<td>Perform spinal procedure</td>
<td>Hand over patient to clean team who will transfer her back to her room (midwife looking after patient and someone to push bed)</td>
<td>Remove PPE as described</td>
<td></td>
</tr>
<tr>
<td>(low risk of conversion to GA)</td>
<td>Wear this PPE throughout case</td>
<td>Wash hands with soap and water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid resistant surgical mask</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gloves</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic apron</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C Emergency Caesarean delivery</strong></td>
<td>Put on AGP PPE in an area at least 2m away from patient prior to induction</td>
<td>Ask patient to clean hands with gel and to put on FRSM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(General anaesthesia or neuraxial with high risk of conversion to GA)</td>
<td>Undertake induction and intubation</td>
<td>Add a well fitted oxygen mask if needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGP PPE</td>
<td>Keep AGP PPE on until after extubation</td>
<td>Wait for 20 minutes in theatre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hand Hygiene</td>
<td></td>
<td>Hand over to clean team who will be wearing standard PPE (midwife looking after patient + someone to push bed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disposable Single Use Nitrile Gloves</td>
<td></td>
<td>Patient transferred to room by clean team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Long sleeved disposable gown</td>
<td></td>
<td>• Remove AGP PPE as per doffing procedure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FFP respirator mask</td>
<td></td>
<td>• Wash hands with soap &amp; water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Eye Protection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adapted from N Lucas, J Bamber and F Donald on behalf of the OAA, 20 March 2020
13 Workforce considerations


Health workers are at the front line of any outbreak response and as such are exposed to hazards that put them at risk of infection with an outbreak pathogen (in this case COVID-19 infection from SARS-CoV2). Hazards include pathogen exposure, long working hours, psychological distress, fatigue, occupational burnout, stigma, and physical and psychological violence. This document highlights the rights and responsibilities of health workers, including specific measures needed to protect occupational safety and health.


Healthcare worker rights include that employers and managers in health facilities:

- assume overall responsibility to ensure that all necessary preventive and protective measures are taken to minimize occupational safety and health risks;
- provide information, instruction and training on occupational safety and health, including;
  - Refresher training on infection prevention and control (IPC);
  - Use, putting on, taking off and disposal of personal protective equipment (PPE);
- provide adequate IPC and PPE supplies (masks, gloves, goggles, gowns, hand sanitizer, soap and water, cleaning supplies) in sufficient quantity to healthcare or other staff caring for suspected or confirmed cases of COVID-19, such that workers do not incur expenses for occupational safety and health requirements;
- familiarize personnel with technical updates on COVID-19 and provide appropriate tools to assess, triage, test and treat patients and to share infection prevention and control information with patients and the public;
- as needed, provide with appropriate security measures for personal safety;
- provide a blame-free environment for workers to report on incidents, such as exposures to blood or bodily fluids from the respiratory system or to cases of violence, and to adopt measures for immediate follow-up, including support to victims;
- advise workers on self-assessment, symptom reporting and staying home when ill;
- maintain appropriate working hours with breaks;
- consult with healthcare workers on occupational safety and health aspects of their work and notify appropriately of cases of occupational disease;
- ensure healthcare workers are not required to return to a work situation where there is continuing or serious danger to life or health, until the employer has taken any necessary remedial action;
- provide access to mental health and counselling resources; and
- enable co-operation between management and workers and/or their representatives.

Healthcare workers should:

- follow established occupational safety and health procedures, avoid exposing others to health and safety risks and participate in employer-provided occupational safety and health training;
- model good hygiene practices
- use provided protocols to assess, triage and treat patients;
- treat patients with respect, compassion and dignity;
- maintain patient confidentiality;
- swiftly follow established public health reporting procedures of suspected and confirmed cases of COVID-19 infection;
- provide or reinforce accurate infection prevention and control and public health information, including to concerned people who have neither symptoms nor risk;
- put on, use, take off and dispose of personal protective equipment properly;
• self-monitor for signs of illness and self-isolate or report illness to managers and to occupational health, if it occurs;
• advise management if they are experiencing signs of undue stress or mental health challenges that require support interventions.

**Staff education and training**

In a pandemic situation education and training of staff is vital to ensure staff safety and delivery and continuation of a safe, effective service.

This includes:-

• training and fit-testing for staff likely to use PPE.
• training in infection control measures for all members of the multidisciplinary team.
• regular practice drills of all possible emergency scenarios in the hospital.

These must include doffing and donning of PPE in an emergency situation.

Drills must be attended by all members of the multidisciplinary team.

Healthcare workers have a responsibility to keep informed and keep up to date with information from accurate sources. Maternity units should ensure that evidence-based information updates, from trustworthy sources (e.g. Department of Health, HSE, Professional bodies and Professional colleges) are provided to all grades of staff regularly.

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/guidanceforhealthcareworkers/

Another useful resource may be The Royal College of Physicians of Ireland website, they providing updates, access to clinical guidance and helpful resources.

https://www.rcpi.ie/covid19/

**Staff resourcing and deployment**

Employers have an important role in communication with staff, providing clear policies on pay, sick leave and self-isolation. Support for the latter is vital to guarantee compliance and to prevent the unnecessary spread of infection (RCPI, 2020).

**Deployment**

Healthcare workers assigned to care for patients with COVID-19 infection or who work in areas of a hospital segregated for patients with COVID-19 infection should as much as possible not be assigned to care for non COVID-19 infected patients or work in non COVID-19 areas. Hospitals should also give consideration to reducing cross-site working arrangements (in several hospitals) for their staff, unless this is considered of critical importance.

**Newly recruited staff**

At this time it is expected that there will be an increase in recruitment of healthcare staff. These will include newly-qualified staff, staff returning to work after retirement or who had left the health services, as well as agency staff who may be new to working in the facility.

While it may not be possible to provide a formal induction programme for these staff at this time, hospitals should consider developing a manual/quick reference guide for these staff with relevant information to their employing hospital. These staff must be supported in their work by senior colleagues.
The Office of Nursing & Midwifery Services Director (ONMSD) has developed online education and training resources to help upskill nursing and midwifery staff returning to work during COVID-19 crisis. Access to these Covid-19 Resource Packs are available in the course catalogues section on HSELandD.

Staff who are returning to practice and need support with education and training can contact the local Centre of Nurse and Midwifery Education (CNMEs) or the local Nursing and Midwifery Planning and Development Units (NMPDUs).

Healthcare workers at risk for complications from COVID-19

Healthcare workers who are at risk for complications of COVID-19 infection (e.g. immunocompromised workers), should be considered for alternate work assignment, away from direct patient care or areas of high exposure risk for the duration of the pandemic. At the very least they should not provide care to patients known to have COVID-19 nor enter parts of the hospital segregated for the treatment of patients with COVID-19 infection.

The HSE has published a list of those who are considered vulnerable healthcare workers. [https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/occupationalhealthguidance/Pregnant%20HCWs,%20Vulnerable%20HCWs&%20Other%20HCWs%20with%20Pre-existing%20Disease.pdf](https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/occupationalhealthguidance/Pregnant%20HCWs,%20Vulnerable%20HCWs&%20Other%20HCWs%20with%20Pre-existing%20Disease.pdf)

Pregnant healthcare workers

Employers should be sensitive to the fact that pregnant women are, appropriately, often anxious about their own health and protective of their unborn baby. Pregnant healthcare workers are specifically impacted by the nature of their professional activities and exposure. This risk applies particularly, but is not limited to, those in nursing and midwifery, or those providing medical, or ancillary care, to known infected patients. Risk seems to be proportional to exposure duration and is higher for some occupations that involve aerosolisation.

Pregnant health care workers should therefore be allocated to patients, and duties, that have reduced exposure to patients with, or suspected to have, COVID-19 infection. It is specifically recommended to avoid rostering pregnant staff to COVID-specific units or wards, and redeployment to lower risk duties should be considered. Those pregnant staff who also have underlying medical conditions should discuss with their treating obstetrician as redeployment or working from home may be further advised.

The HSE’s list of those who are considered vulnerable healthcare workers includes women who are pregnant with significant heart disease, congenital or acquired. [https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/occupationalhealthguidance/Pregnant%20HCWs,%20Vulnerable%20HCWs&%20Other%20HCWs%20with%20Pre-existing%20Disease.pdf](https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/occupationalhealthguidance/Pregnant%20HCWs,%20Vulnerable%20HCWs&%20Other%20HCWs%20with%20Pre-existing%20Disease.pdf)


Staff uniforms

The appropriate use of PPE will protect uniforms from contamination in most circumstances. During a pandemic, healthcare workers should not travel to and from work or between hospital residences and place of duty in uniform or in scrubs. Hospitals and other healthcare facilities recognize the challenges that healthcare workers face in frequent changing of uniforms.
facilities should provide changing rooms/areas where staff can change into uniforms upon arrival at work. Hospitals should provide shower facilities for staff to use as necessary.

**Occupational Health**

Occupational health will take lead responsibility for screening programmes and contact tracing for healthcare workers, and will liaise with the Infection control team to give general advice on the management of staff with COVID-19 infection.

https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/guidance/occupationalhealthguidance/

In institutions where there is no occupational health physician, the General Manager will consult with the Chair of the Medical Executive to assign this role to a suitable doctor (HSE, 2008).


**Staff Care and Wellbeing**

Healthcare staff are at increased risk of stress and mental health problems when dealing with challenges of the COVID-19 pandemic. Self-care is a priority. Healthcare managers need to proactively take steps to protect the wellbeing of their staff.

Staff must be supported:-
- by reinforcing good team structures.
- by ensuring sufficient rest and respite during work or between shifts.
- By ensuring that sufficient and healthy food is provided to them when in work.
- By providing regular opportunities to discuss decisions and check on staff wellbeing.

Employee Assistance Programmes (EAP) may be helpful to support staff.


https://www2.hse.ie/wellbeing/mental-health/minding-your-mental-health-during-the-coronavirus-outbreak.html


The constant stream of new reports can cause worry to many people. Reliable sources are best to get news, including:

- The Health Service Executive (HSE) https://www2.hse.ie/coronavirus/
- Health Protection Surveillance Centre https://www.hpsc.ie/
- HSE Work Well http://workwell.ie/

The Workplace Health and Wellbeing Unit announced the launch of a dedicated Healthcare worker COVID-19 helpline (Call Save 1850 420 420). The helpline will assist staff and managers with information and advice during this COVID-19 period.

It important to stress that this number is for **health care workers only.**
The anticipated needs of staff will vary across each of the phases; consider the following support mechanisms:

<table>
<thead>
<tr>
<th>Phases</th>
<th>Issues and likely impact</th>
<th>Needs and recommended approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-phase:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No cases on unit</td>
<td>Anticipatory anxiety about what’s on its way.</td>
<td>Increase a sense of control - the team are in a safe pair of hands.</td>
</tr>
<tr>
<td></td>
<td>Inability to think clearly, feeling overwhelmed, planning.</td>
<td>Reassurance and planning. Communication updates are key (you may be thinking ahead, they are thinking now).</td>
</tr>
<tr>
<td></td>
<td>Communication errors.</td>
<td>Escalation plan.</td>
</tr>
<tr>
<td></td>
<td>Tension in working relationships.</td>
<td>Support to managers who are making plans and holding the stresses.</td>
</tr>
<tr>
<td></td>
<td>“Readiness” burnout.</td>
<td></td>
</tr>
<tr>
<td><strong>Initial phase:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case 1</td>
<td>Starting to get going, lots of trying out, lost time, repetition and frustration.</td>
<td>War room – planning central to allow centralised communication.</td>
</tr>
<tr>
<td></td>
<td>Further anticipatory anxiety.</td>
<td>Management are visible and available.</td>
</tr>
<tr>
<td><strong>Core Phase: Full scale</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple cases</td>
<td>Biggest risk period.</td>
<td>Rotate workers from high-stress to lower-stress functions.</td>
</tr>
<tr>
<td></td>
<td>Fear infection and implications for families.</td>
<td>Small pre-brief and debrief the day.</td>
</tr>
<tr>
<td></td>
<td>Overwhelming workload.</td>
<td>Partner inexperienced workers with their more experienced colleagues.</td>
</tr>
<tr>
<td></td>
<td>Full go mode- adrenaline and automatic pilot. Exhaustion.</td>
<td>Psychological first aid - drop-in sessions for staff with employee wellbeing if you have it.</td>
</tr>
<tr>
<td></td>
<td>Moral distress as healthcare rationed.</td>
<td>Ensure the basics: Breaks, Facilities (food trolley in staff room), Sleep, Days off.</td>
</tr>
<tr>
<td></td>
<td>Distress linked to personal or family experience of COVID-19.</td>
<td>Manage visitors.</td>
</tr>
<tr>
<td></td>
<td>Experience fear or stigma when out in public.</td>
<td></td>
</tr>
<tr>
<td><strong>End Phase:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immediate aftermath</td>
<td>Exhaustion and post trauma recovery/ stress</td>
<td>Debriefing.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Staff 1-1 and group sessions. Learning and preparation for the future. Organise thanks and reward.</td>
</tr>
<tr>
<td><strong>Long term</strong></td>
<td>Some ongoing PTSD Reflection and learning</td>
<td>Look out for signs of PTSD in staff:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• on edge and hyper arousal, poor sleep</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• flashbacks or re-experiencing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• avoidance of reminders.</td>
</tr>
</tbody>
</table>

Adapted from Highfield, 2020, Intensive Care Society; [www.ics.ac.uk](http://www.ics.ac.uk)
Triage and risk factor screening for COVID-19 infection

Screening and containment measures have been successful in slowing the spread of the virus, and provided a small window of time for preparation of the response. In the general population identifying infected patients and isolating them within 48 hours of the onset of even mild symptoms is recommended.

Advise a woman if she or her birth partner have suspected or confirmed COVID-19 infection to inform the maternity hospital prior to arrival to allow consideration of infection control and service planning, for example: identifying the most appropriate room for labour and birth, ensuring infection prevention and control supplies and PPE are available, informing workforce involved in care.

Triage and risk screen pregnant women presenting for pregnancy-related concerns in a dedicated area. Establish triage and risk screening capability for maternity patients before entry to inpatient and outpatient areas including Birthing Suites, Antenatal Clinics and Fetal Assessment Units.

Use open-ended screening questions for antenatal clinic phone enquiries, birthing suite enquiries, admission room enquiries and postnatal home visiting initial phone contacts.

Consider the need for screening and isolation with respect to urgency of required care.

Each maternity hospital must agree their own patient pathways which will reflect the practices within their hospital. The information below should be considered when preparing individual hospital pathways.

For women presenting for maternity care

If suspected or confirmed COVID-19:
- Utilise isolation and transmission precautions
- Use isolation rooms on the antenatal and postnatal wards
- Where available, utilise negative pressure birthing room for confirmed COVID-19
- Inform neonatal team of birth plans as early as possible

If COVID-19 not suspected:
- Utilise usual care pathways
- Avoid exposure to other known or potentially infected patients

Inter-Hospital Transfer – Obstetric and Neonatal

- All Inter-hospital transfers need consultant to consultant assessment and decision-making based on consideration of all factors and importantly urgency relative to capacity
- Coordinate retrievals via the usual pathway with the National Ambulance Service or National Neonatal Transport Service where applicable.
- Coronavirus infection is not an indication for transfer/retrieval in the absence of other indications

Mother and baby contact if mother suspected or confirmed COVID-19 infection

- To reduce the risk of transmission of the virus that causes COVID-19 infection from the mother to the baby, the hospital must consider whether there is need to separate the mother and baby, and should consider the risks and benefits of this approach.
- Consider the individual situation in assessing whether there is any need for temporary separation - this will depend on the clinical condition and disease severity in the mother.
• Involve multidisciplinary team including consultant obstetrician, midwife in charge, and consultant neonatologist/paediatrician, and neonatal/paediatric nurse in charge
• If mother and baby rooming in:
  ▪ Provide facemask and hand hygiene information to the mother including washing hands before touching baby and body where baby may make skin to skin contact
  ▪ Support breastfeeding according to mothers intention – use transmission precautions while breastfeeding (facemask and hand hygiene)
  ▪ Consider maintaining general isolation distance of 2m where possible
• If temporarily separating mother and baby:
  ▪ Consider and support the mother’s intention to breastfeed
  ▪ If temporarily separated, encourage to express their breast milk to establish and maintain milk supply. If possible, a dedicated breast pump should be provided. Prior to expressing breast milk, mothers should practice hand hygiene. After each pumping session, all parts that come into contact with breast milk should be thoroughly washed and the entire pump should be appropriately disinfected per the manufacturer’s instructions. This expressed breast milk should be fed to the newborn by a caregiver.
• If the mother is unable to care for the baby due to illness, consider sending baby home for home isolation – this decision must be discussed within the multidisciplinary team.

Visitors

• A visiting policy for Maternity Hospitals/ Units will be decided by management in each hospital, following guidance from the HSE, taking the clinical situation in each individual hospital at the time into account.
• Advise staff and patients to check for daily updates.
• Advise security and reception staff of the daily updates as soon as they have been decided.

Maternity Services Management

Recommendations to manage the service during the COVID-19 Pandemic

Outpatient services
• Ensure availability of isolation room for provision of antenatal and postnatal care
• Reduce on site hospital-based outpatient services as much as feasible
• Establish pathways to redirect normal-risk women to community-based antenatal care clinics, and utilise community facilities to run antenatal clinics. Ensure they are staffed with senior clinicians with decision-making capacity
• Continue services and facilitate provision of high-risk obstetric services.
• Consider a reduction in the amount of routine ultrasound scans being offered at this time. Suggestions to decrease the number of ultrasound appointments in the context of COVID-19 infection, must be individualised to ultrasound units
• Facilitate early transfer home where appropriate for mother and baby
• Continue to arrange Newborn Screening in the community, as appropriate

Gynaecology
• Routine gynaecology clinics should be postponed. This decision must be made by senior clinicians with hospital management. Patient lists for upcoming clinics need to be assessed by a senior clinician.
• Routine gynaecological day case procedures should be postponed and all elective surgery should be cancelled.
• Arrangements should be put in place to safely continue cancer surgery and urgent / emergency gynaecology procedures

Neonatal Unit/Special Care Baby Unit
• Establish isolation rooms within the NNU/SCBU
• Establish a well-baby nursery
• Consider the parent visiting policy in the NNU/SCBU (take note of guidance from HSE)
• Provide room for mother to express breastmilk (allowing for physical distancing)
Obstetric Theatres
• Where feasible, assign a specific operating theatre for operating on confirmed or suspected COVID-19 infected patients. This may require liaison with the theatre governance committees for co-located general hospitals.
• Consider need for extra PPE supplies and ensure availability of same
• Secure separate recovery area for COVID-19 positive theatre cases

Allied Health Professional Services
• Consideration needs to be given to the postponement of outpatient physiotherapy, occupational therapy, and speech and language clinics
• Consideration needs to be given to rearranging social work appointments, and to undertaking urgent consultations on the telephone

Isolation Facilities
• Establish isolation capacity for women and their baby requiring admission
• Home isolation is recommended where inpatient admission is not clinically necessary
• Inpatient and outpatient hospital-based care will need isolation capacity for all areas in maternity including antenatal, pregnancy assessment, birthing, peri-operative, postnatal, and neonatal units
• Consideration should be given to dividing the hospital into zones to signpost staff regarding use of PPE and level of risk in different clinical areas
• Isolation rooms should ideally have an ante-chamber for putting on and removing staff PPE equipment and en-suite bathroom facilities
• Where possible use designated single rooms for isolation. Designate multi-occupancy rooms as isolation bays as needed.
• Only essential staff should enter isolation rooms.
• Consider isolation capacity and pathways for advanced levels of care e.g. High Dependency Unit Care
• Consideration needs to be given to proximity of isolation rooms to equipment, hand-washing facilities, safe PPE donning and doffing area

Cleaning of Maternity Facilities
• The Infection, Prevention and Control Committee in each Maternity unit must prepare/update a manual for staff on cleaning of the environment and equipment following exposure to COVID-19.
• All clinical areas will need to be deep-cleaned after any involvement with a COVID-infected case
• Training/up-skilling for housekeeping staff in cleaning procedures in these situations should be provided
• Particular attention should be given to regular cleaning of frequently used surfaces in clinical areas; to include computer keyboards, phones, ward desks and COWs (computers on wheels)

Staff Facilities
• Provide appropriate facilities for staff to have their meal breaks where physical distancing can be facilitated
• Provide appropriate changing facilities with showers for staff use
• Provide free on-site car parking for staff
Communication and Information Sharing

- Consider developing a communication plan on how to inform staff on updates to practice
- Various methods of communication must be considered as not all staff will have access to email
- Staff must be made aware of how often updates will be circulated
- Facilitate staff to give feedback on how the changes to work practices are being implemented
- Include all grades and disciplines of staff in updates
- Inform staff of who is responsible for managing the COVID-19 outbreak in their area
- Brief all staff on updates weekly (adhering to physical distancing practices)
- Consider the use of an electronic document sharing programme to make information readily available to staff

15 Audit and reporting

Clinical guidelines are developed, based on a thorough evaluation of the evidence, to assist decisions about appropriate health care for specific clinical circumstances (64, 65). The rapid emergence of COVID-19 means that there is limited evidence on transmission patterns, associated risk factors and complications in pregnancy and/or birth.

In order to proactively measure the effectiveness of the response to COVID-19 the National Women and Infants Health Programme (NWIHP) have directed the National Perinatal Epidemiology Centre (NPEC) to engage with all maternities units to establish a national audit on COVID-19 infection. To ensure this clinical audit is robust and of high quality, it will align with guidance from international bodies including the WHO and the RCOG.

All units should report and provide information of all pregnant women and newborns who have been tested for COVID-19 to the NPEC register. A record of COVID-19 positive cases should be maintained as the NPEC will complete an in-depth national audit later in 2020. All units should maintain data entry practices that continue to provide up to date, quality data.

The following items are a sample of the type of data which will be requested to the maternity units nationally, by the NPEC:
- Epidemiological factors to define the type of contact with COVID-19 (SARS-CoV-2)
- Signs and symptoms at admission
- Co-morbidities
- Treatment and medication
- Complications during episode
- Laboratory and radiological characteristics
- Antenatal care
- Neonatal testing
- Delivery details
- Outcome

The purpose of this national audit is to facilitate identification of key epidemiological and clinical characteristics of COVID-19 in order to determine associated risk factors, possible complications in pregnancy and/or birth and further potential impacts of the virus. The data collected from this audit will be critical to inform future clinical guidance.

UK cases are being reported to the UK Obstetric Surveillance System (UKOSS) via each NHS Trust’s local UKOSS reporter. [https://www.npeu.ox.ac.uk/ukoss/current-surveillance/covid-19-in-pregnancy](https://www.npeu.ox.ac.uk/ukoss/current-surveillance/covid-19-in-pregnancy)

There also is an international registry (Lausanne University Hospital) and a US UCSF-based national study. [https://www.chuv.ch/fr/dfme/dfme-home/recherche/femme-mere/materno-fetal-and-obstetrics-research-unit-prof-baud/covi-preg/](https://www.chuv.ch/fr/dfme/dfme-home/recherche/femme-mere/materno-fetal-and-obstetrics-research-unit-prof-baud/covi-preg/) and [https://priority.ucsf.edu/](https://priority.ucsf.edu/)
References

11. Ying Liu1, Albert A. Gayle2, Annelies Wilder-Smith3,4 and Joacim Rocklöv2. The reproductive number of COVID-19 is higher compared to SARS coronavirus. Journal of Travel Medicine 2020, 1-4
35. Lian Chen, Qin Li, Danni Zheng, Hai Jiang, Yuan Wei, Li Zou, Ling Feng, Guoping Xiong, Guoqiang Sun, Haibo Wang, Yangyu Zhao, Jie Qiao, Clinical Characteristics of Pregnant
40. Lin Qiu, Xia Liu, Meng Xiao, Jing Xie, Wei Cao, Zhengyin Liu, Abraham Morse, Yuhua Xie, Taisheng Li, Lan Zhu. SARS-CoV-2 is not detectable in the vaginal fluid of women with severe COVID-19 infection. Clinical Infectious Diseases, ciaa375, Apr 2
46. https://ripe-tomato.org/2020/04/05/covid-19-in-pregnancy-news-reports/

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Professional guidance documents referenced


Bourne T et al. ISUOG Consensus Statement on rationalization of early-pregnancy care and provision of ultrasonography in context of SARS-CoV-2. ISUOG 2020


Useful Links

Ireland
https://www2.hse.ie/coronavirus/
https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/
https://hselibrary.ie/covid-19-evidence-sources/
https://www.rcpi.ie/covid19/
https://www.medicalcouncil.ie/covid-19/

Professional colleges and bodies
https://www.isuog.org/clinical-resources/coronavirus-covid-19-resources.html
https://www.smfm.org/covid19
https://www.rcpch.ac.uk/resources/covid-19-guidance-paediatric-services#working-in-neonatal-settings
https://icmanaesthesiacovid-19.org/
https://www.aappublications.org/cc/covid-19

Academic resources
https://www.bmj.com/coronavirus
https://www.thelancet.com/coronavirus
### APPENDIX 1

<table>
<thead>
<tr>
<th>Lead Author</th>
<th>Date published</th>
<th>Journal</th>
<th>Location</th>
<th>Number of cases</th>
<th>Main findings</th>
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<tbody>
<tr>
<td>Zhu, H</td>
<td>Feb 10</td>
<td>Transl Ped</td>
<td>Union Hospital, Tongji Medical College</td>
<td>9†</td>
<td><strong>1 NND 34 weeks</strong> – not infected, Fetal distress in 6 cases, 6/9 delivered preterm</td>
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<tr>
<td>Chen, H</td>
<td>Feb 12</td>
<td>Lancet</td>
<td>Zhongnan Hospital of Wuhan University</td>
<td>9</td>
<td>No adverse outcomes</td>
</tr>
<tr>
<td>Liu, W</td>
<td>Feb 25</td>
<td>Preprints</td>
<td>Union Hospital, Tongji Medical College</td>
<td>3*†</td>
<td>No adverse outcomes</td>
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<tr>
<td>Wang, X</td>
<td>Feb 28</td>
<td>Clin Infect Dis</td>
<td>Affiliated Infectious Hospital of Soochow University</td>
<td>1</td>
<td>Maternal ICU admission 30 week EM CS delivery -fetal distress Good outcome</td>
</tr>
<tr>
<td>Chen, S</td>
<td>Mar 1</td>
<td>Zhonghua Bing Li Xue Za Zhi</td>
<td>Union Hospital, Tongji Medical College</td>
<td>3 (*same cases Liu)</td>
<td>No unusual findings in placental pathology</td>
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<tr>
<td>Liu, Y</td>
<td>Mar 4</td>
<td>J Infect</td>
<td>Sun Yat-sen University, Guangzhou</td>
<td>13</td>
<td><strong>1 stillbirth</strong> – no detail 1 maternal ICU admission with ECMO, ongoing 6/13 preterm labour</td>
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<td>Li, Y</td>
<td>Mar 5</td>
<td>Emerg Infect Dis</td>
<td>Zhejiang University, Hangzhou</td>
<td>1</td>
<td>No adverse outcomes</td>
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<tr>
<td>Zhang, L</td>
<td>Mar 7</td>
<td>Zhonghua Fu Chan Ke Za Zhi</td>
<td>Eastern Hospital of Wuhan University People’s Hospital</td>
<td>16¢</td>
<td>No adverse outcomes, 1 severe case (abstract only but Schwartz translated)</td>
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<tr>
<td>Wen, R</td>
<td>Mar 10</td>
<td>J Microbiol Immunol</td>
<td>Qingdao</td>
<td>1</td>
<td>No adverse outcomes, ongoing</td>
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<td>Wang, S</td>
<td>Mar 12</td>
<td>Clin Infect Dis</td>
<td>Tongji Medical College, Wuhan</td>
<td>1‡</td>
<td>Infected neonate at 36h (born by CS)</td>
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<td>Chen, R</td>
<td>Mar 16</td>
<td>Can J Anaesth</td>
<td>Renmin Hospital, Wuhan</td>
<td>17¢ (duplicates Zhang/Fan)</td>
<td>Details of Caesarean births, all good outcomes</td>
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<td>Fan, C</td>
<td>Mar 17</td>
<td>Clin Infect Dis</td>
<td>Renmin Hospital, Wuhan</td>
<td>2¢</td>
<td>No adverse outcomes</td>
</tr>
<tr>
<td>Liu, D</td>
<td>Mar 18</td>
<td>AJR</td>
<td>Union Hospital, Tongji Medical College</td>
<td>15† (includes Zhu + Liu; ?adds 3)</td>
<td>No adverse maternal outcomes reported - 4 ongoing pregnancies</td>
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<td>Liu, H</td>
<td>Mar 21</td>
<td>J Infect</td>
<td>Maternal and Child Health Hospital of Hubei Province,</td>
<td>41 (likely duplicates from same hospital)</td>
<td>Clinical and CT features – no birth outcomes</td>
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<td>Kang, X</td>
<td>Mar 24</td>
<td>Zhejiang Da Xue Xue Bao Yi Xue Ban</td>
<td>Zhejiang University School of Medicine, Hangzhou</td>
<td>1</td>
<td>No adverse outcomes</td>
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<tr>
<td>Authors</td>
<td>Date</td>
<td>Journal</td>
<td>Affiliation</td>
<td>Number of Neonates</td>
<td>Summary</td>
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<td>Yu, N</td>
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<td>Lancet Infectious Dis</td>
<td>Tongji Medical College, Wuhan</td>
<td>7+ (includes Wang)</td>
<td>One infected neonate No maternal adverse outcomes</td>
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<tr>
<td>Breslin, N</td>
<td>Mar 27</td>
<td>AJOG MFM</td>
<td>NYC Presbyterian</td>
<td>7±</td>
<td>2 maternal ICU admissions peripartum</td>
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<tr>
<td>Lan Dong</td>
<td>Mar 26</td>
<td>JAMA</td>
<td>Renmin Hospital, Wuhan</td>
<td>1</td>
<td>Neonate with IgM antibodies 23 days after maternal infection, negative for infection</td>
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<td>Zeng, H</td>
<td>Mar 26</td>
<td>JAMA</td>
<td>Zhongnan Hospital of Wuhan University</td>
<td>6</td>
<td>All neonates had antibodies, 2 had IgM, all negative for infection No maternal adverse outcomes</td>
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<td>Zeng, L</td>
<td>Mar 26</td>
<td>JAMA Pediatrics</td>
<td>Wuhan Children’s Hospital</td>
<td>33 neonates</td>
<td>3 infected neonates on day 2 (all born by CS), normal outcomes</td>
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<td>Chen, S</td>
<td>Mar 28</td>
<td>J Med Virol</td>
<td>Maternal and Child Hospital of Hubei Province</td>
<td>5</td>
<td>No adverse outcomes</td>
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<tr>
<td>Zambrano, L</td>
<td>Mar 20</td>
<td>Travel Med Infect Dis</td>
<td>Hospital Escuela of Tegucigalpa, Honduras</td>
<td>1</td>
<td>Preterm labour at 32 weeks, neonate well</td>
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<tr>
<td>Iqbal, S</td>
<td>Apr 1</td>
<td>NEJM</td>
<td>MedStar Washington Hospital Center</td>
<td>1</td>
<td>Term SVD, no adverse outcomes</td>
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<tr>
<td>Lingkong, Z</td>
<td>Apr 1</td>
<td>Chinese Journal of Pediatrics</td>
<td>Wuhan Children’s Hospital</td>
<td>1</td>
<td>Parents infected day 14 post-delivery, neonate infected day 17, recovered</td>
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<tr>
<td>Hwan Lee, D</td>
<td>Apr 2</td>
<td>KJA</td>
<td>Korea</td>
<td>1</td>
<td>No adverse outcomes</td>
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<tr>
<td>Karimi-Zarchi</td>
<td>Apr 3</td>
<td>Fetal Ped Pathol</td>
<td>Iranian Health Ministry – website source</td>
<td>3 (part of a review)</td>
<td>2 mothers reported developed ARDS and died –, all neonates survived, no detail</td>
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<td>Gidlof, S</td>
<td>Apr 6</td>
<td>AOGS</td>
<td>Stockholm South General Hospital, Stockholm</td>
<td>1</td>
<td>Multiple pregnancy 36/40, severe PET, EM CS then COVID positive, neonates well</td>
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<td>Juusela, A</td>
<td>Apr 3</td>
<td>AJOG MFM</td>
<td>Newark Beth Israel Medical Center</td>
<td>7</td>
<td>2 women critically unwell with cardiomyopathy (one CPA, remains in ICU). 5 ongoing</td>
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<td>Breslin, N</td>
<td>Apr 9</td>
<td>AJOG MFM</td>
<td>Columbia University Medical Center AND NYC Presbyterian</td>
<td>43± (includes previous reported NYC 7 cases)</td>
<td>37 – mild disease 4 (9%) – severe 2 (5%) – critical (PN) 14 initially asymptomatic 4 readmissions All neonates well</td>
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<td>Kalafat, E</td>
<td>Apr 6</td>
<td>UOG</td>
<td>Ankara University, Turkey</td>
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<td>ICU admission (ongoing postnatal) Neonate not infected</td>
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<td>Li, N</td>
<td>Apr 7</td>
<td>Clin Infect Dis</td>
<td>Maternal and Child Health Hospital of Hubei Province</td>
<td>16</td>
<td>3/16 preterm delivery 2/16 vaginal delivery No critical illness No infected neonates</td>
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<td>Author</td>
<td>Date</td>
<td>Journal</td>
<td>Location/Institution</td>
<td>Count</td>
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<td>Ferrazzi, E</td>
<td>Apr 8</td>
<td>Int J Gynaecol Obstet</td>
<td>Lombardy region, Italy (6 hubs)</td>
<td>42</td>
<td>7 severe – CPAP and/or ICU admission 2 preterm deliveries</td>
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<td>Xiong, X</td>
<td>Apr 10</td>
<td>J Med Virol</td>
<td>YouAn Hospital, Capital Medical University, Beijing,</td>
<td>1</td>
<td>35 weeks, recovered NVD 38 weeks, neonate not infected</td>
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<td>Zhang, ZJ</td>
<td>Apr 10</td>
<td>Eur J Resp</td>
<td>Wuhan University</td>
<td>4</td>
<td>4 infected neonates, all born by CS, 3 separated, all positive mothers, all outcomes good</td>
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<td>Khan, S</td>
<td>Apr 10</td>
<td>Infection Control &amp; Hospital Epidemiology</td>
<td>Renmin Hospital of Wuhan University</td>
<td>3</td>
<td>1 preterm delivery, all vaginal births, no neonates infected</td>
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<td>Wu, Xq</td>
<td>Apr 11</td>
<td>In J Gynecol Obstet</td>
<td>Central Hospital of Wuhan</td>
<td>23</td>
<td>3 T1TOP. 6 threatened loss or PROM. 2/20 vaginal deliveries No infected neonates</td>
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<td>Apr 8</td>
<td>Clin Micro Infect</td>
<td>Hubei general hospital (Renmin Hospital)</td>
<td>17</td>
<td>All delivered by CS. Two suspected infected neonates.</td>
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<td>Sutton, D</td>
<td>Apr 13</td>
<td>NEJM</td>
<td>Columbia University Medical Center AND NYC Presbyterian</td>
<td>33</td>
<td>All women screened - 13% asymptomatic women were positive. No birth details</td>
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<td>Karami, P</td>
<td>Apr 11</td>
<td>Travel Medicine and Infectious Disease</td>
<td>Vali-e-asr Hospital, Zanjan University of Medical Sciences, Iran</td>
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<td>Maternal Death at 30 weeks. ICU admission, preterm labour, stillborn infant by vaginal delivery. PM confirmed SARS-CoV2</td>
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<td>Yang, H</td>
<td>Apr 12</td>
<td>J Infect</td>
<td>Tongji Medical College, Wuhan</td>
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<td>4/13 vaginal deliveries All Mild disease</td>
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<td>Tekbali, A</td>
<td>Apr 15</td>
<td>AJOG</td>
<td>14-hospital group in New York State</td>
<td>62</td>
<td>Describes COVID-19 positive cases presenting to NY hospital group, no outcomes</td>
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<td>Lowe, B</td>
<td>Apr 15</td>
<td>ANZOG</td>
<td>Bond University Hospital, Southport, Queensland</td>
<td>1</td>
<td>Vaginal delivery at 40 weeks, both outcomes good</td>
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<td>Koumoutsea, E</td>
<td>Apr 17</td>
<td>J Throm Haemost</td>
<td>Mount Sinai Hospital, University of Toronto, Toronto,</td>
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<td>Progressive coagulopathy in 2 women, 35 weeks, both CS, recovered with delivery</td>
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<td>González Romero D</td>
<td>Apr 17</td>
<td>Revista Clinica Española</td>
<td>University Hospital, Las Palmas, Gran Canaria</td>
<td>1</td>
<td>29 weeks, severe illness, ICU, ventilation, delivery by emCS, both recovered</td>
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<td>Chen, Lian</td>
<td>Apr 17</td>
<td>NEJM</td>
<td>National Health Commission of China – review from 19/50</td>
<td>118</td>
<td>No maternal deaths. No neonatal deaths. 9 early pregnancy losses reported (inc 4 TOP).</td>
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<tr>
<td>Author</td>
<td>Date</td>
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<td>Location</td>
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<td>Alzamora, MC</td>
<td>Apr 18</td>
<td>Am J Perinatol</td>
<td>British American Hospital, Lima Peru</td>
<td>9/118 women had severe disease (8%); 1 critical. 21% deliveries preterm but half iatrogenic.</td>
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<td>Schnettler, WT</td>
<td>Apr 14</td>
<td>AJOG MFM</td>
<td>Good Samaritan Hospital, Cincinnati</td>
<td>1 ICU admission, ventilation 33 weeks, CS delivery, neonatal swab positive at 16 hours, no antibodies</td>
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<td>Wu, C</td>
<td>Apr 20</td>
<td>Virol Sin</td>
<td>Maternal and Child Health Hospital of Hubei Province, Wuhan</td>
<td>6 (all duplicates) Review of clinical presentations and lab findings – 6 confirmed cases</td>
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<td>Lancet Infect Dis</td>
<td>Tongji Hospital, Wuhan</td>
<td>2 Amniocentesis in second trimester after COVID in first trimester–negative AF</td>
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<td>Browne, PC</td>
<td>Apr 24</td>
<td>Am J Perinatol</td>
<td>Lexington Medical Center, West Columbia, South Carolina</td>
<td>1 Preterm labour at 24 weeks, treated and recovered, ongoing</td>
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<tr>
<td>Vintzileos, WS</td>
<td>Apr preprint</td>
<td>AJOG</td>
<td>New York University Winthrop Hospital</td>
<td>32 Screening of 161 pregnant women, 32 positive of whom 11 asymptomatic</td>
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<td>Lu, D</td>
<td>Apr 24</td>
<td>J Med Virol</td>
<td>No 2 People’s Hospital of Hefei City</td>
<td>1 Asymptomatic, delivered by CS, both normal outcomes</td>
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<td>Ferrazzi, E</td>
<td>Apr 27</td>
<td>BJOG</td>
<td>Lombardy region (6 hubs)</td>
<td>42 (second report with outcomes) 19/42 had COVID pneumatic, of whom 7 had severe disease and 4 admitted to ICU. 2 neonates tested positive.</td>
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<tr>
<td>Hirshberg, A</td>
<td>Apr preprint</td>
<td>AJOG</td>
<td>Philadelphia</td>
<td>5 5 women required ICU care and ventilation, 2 are undelivered and 1 still in ICU</td>
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<td>Amorim, MMR</td>
<td>Apr preprint</td>
<td>AJOG</td>
<td>Brazil (review includes Iran and Mexico)</td>
<td>9 (may overlap with other Iranian cases) 9 maternal deaths 5 from Brazil, 2 from Iran, 2 from Mexico, limited details and sources</td>
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<tr>
<td>Name</td>
<td>Date</td>
<td>Journal</td>
<td>Country/Setting</td>
<td>Cases/Outcomes</td>
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<td>-----------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Hantoushzadeh, S</td>
<td>Apr 28</td>
<td>AJOG</td>
<td>Iran (review)</td>
<td>9 (may overlap with other Iranian cases) All with severe disease. 7 maternal deaths. 4 stillbirths and 2 neonatal deaths. 1 woman still in ICU.</td>
<td></td>
</tr>
<tr>
<td>Kelly JC</td>
<td>Apr 28</td>
<td>AJOG MFM</td>
<td>Missouri</td>
<td>1 Severe disease at 33 weeks, ICU, ventilation, delivered by emCS</td>
<td></td>
</tr>
<tr>
<td>Zamanian, M</td>
<td>Apr 17</td>
<td>Prenatal Diagnosis</td>
<td>Imam Khomeini Hospital of Mazandaran University, Sari, Iran</td>
<td>1 Maternal death day 15 post CS delivery after severe COVID. Neonate infected but did well.</td>
<td></td>
</tr>
<tr>
<td>Baud, D</td>
<td>Apr 30</td>
<td>JAMA</td>
<td>Lausanne University Hospital</td>
<td>1 Second trimester miscarriage at 19 weeks, placental swabs positive</td>
<td></td>
</tr>
<tr>
<td>Qiancheng, X</td>
<td>Apr 27</td>
<td>Int J Infect Dis</td>
<td>Central Hospital of Wuhan</td>
<td>28 (duplicates) 17 CS and 5 vaginal births, 4 medical TOP. No babies infected and no maternal/neonatal deaths</td>
<td></td>
</tr>
<tr>
<td>Lyra, J</td>
<td>Apr 20</td>
<td>Act Med Port</td>
<td>Portugal</td>
<td>1 Mild/moderate disease at term. Delivered by CS, mother and baby did well</td>
<td></td>
</tr>
<tr>
<td>Liao, J</td>
<td>Apr 29</td>
<td>Int J Obs Gyn</td>
<td>Zhongnan Hospital, Wuhan</td>
<td>88 (duplicates) 10 vaginal births described, 11 neonates not infected</td>
<td></td>
</tr>
<tr>
<td>Buonsenso, D</td>
<td>May 2</td>
<td>Am J Perinatal</td>
<td>Fondazione Policlinico Universitario Agostino Gemelli Rome, Italy</td>
<td>7 One miscarriage at 8 weeks, 4 ongoing pregnancies, 2 CS deliveries with good outcomes</td>
<td></td>
</tr>
</tbody>
</table>

**Published Literature, summary: COVID-19 and Pregnancy**

5 May 2020
APPENDIX 2

Suggested Pathway for pregnant women admitted to general hospital with no on-site obstetric unit with suspected COVID-19

1. **Usual care pathway** for COVID-19 assessment for all
2. Additional steps for pregnancy- use iMEWS for recording vital signs and contact ADON
3. Contact gynaecology team for consult (if provided) required who should link with local obstetric service Not all cases will need direct patient contact to assess obstetric issues.
4. In case of emergency: Contact local hospital Obstetric Consultant on call via switch and they will contact their ADOM to arrange midwifery support should this be required and to contact neonatal Transport Team if delivery planned

Pregnant patient that tests COVID negative

- Suitable for discharge
  - Yes
  - No

Pregnant patient that tests COVID19 positive

- Suitable for discharge
  - Yes
  - No

Follow general adult hospital outpatient patient self-monitoring COVID protocol

- Please contact local obstetric unit to ensure appropriate obstetric follow-up made

In general ward

- Please give discharge summary to patient and advise to attend next scheduled antenatal clinic
- If needs to stay in for medical surveillance in the GIM service, send consult to Gynaec Team
- If patient needs to be transferred for an obstetric reason, contact Obstetric consultant on call in local unit to discuss

In HDU/ICU

- Mx as per NIU/ID COVID guidelines
- If patient needs to be transferred for an obstetric reason, contact Obstetric consultant on call and ADOM to arrange transfer and COVID protocol

Mx as per ICU/ID

In the event of emergency delivery in maternal interest
- Contact Obstetric consultant on call in local unit and ADOM who will co-ordinate with National Neonatal Transport Team

Dr Jennifer Donnelly, Rotunda Hospital, 31032020
Further up to date management information can be found at

https://www.rcog.org.uk/coronavirus-pregnancy


**Assessment of a pregnant woman on the medical take**

**Obstetric History**

- Current pregnancy: Gestational age? single or multiple? current obstetric issues? scans normal? baby moving well?
- Previous pregnancies: Details including mode of delivery

**Any urgent obstetric problems?**

- Bloody discharge?
- Vaginal discharge/fluid?
- Hypertension +/- proteinuria?
- Signs of labour?
- Abdominal pain?

**Examination**

- Observations: consider use of maternal early warning score chart
  - BP ≥ 140/90 mmHg
  - BP ≥ 160/100 mmHg: severe hypertensive: inform Obstetric Registrar urgently
  - Urgent antihypertensive treatment
  - Temp, saturations, respiratory rate, peak flow: UNCHANGED in pregnancy
  - Cardiovascular system: systolic (flow) murmur, bounding pulse: 53 can be normal
  - Respiratory system: No changes due to pregnancy alone
  - Abdominal examination: Uterine tenderness – CONCERNING

**Blood tests: what is normal in pregnancy?**

- HB: Anaemia is defined as <105 g/l in 2nd or 3rd trimester
- WCC: Mild neutrophilia
- Platelets: Mild reduction
- Electrolytes: Mild reduction in Na, others essentially unchanged
- Renal: decrease in urea and creat (view creat > 75 as ABNORMAL)
- Liver: Mild decrease in ALT/AST (view ALT > 40 as ABNORMAL)
- CRP: Unchanged
- Troponin: Unchanged in pregnancy/labour/C section; can ↑ in pre-eclampsia
- D-dimer: Not currently recommended for assessment of possible VTE

**Other investigations**

- Urinalysis: Perform in every pregnant woman
  - Leucocytes: common, not specific for UTI
  - Nitrites: more specific for UTI; send MSU
  - Protein: send lab PCR* if 1+ or more
- CXR: Perform if needed, don’t worry about radiation! Radiation equivalent to 140g brazil nuts
- CT: Radiation dose low; reassure re breast cancer risk (not a reason to avoid—see EECPE 2019)

**Do not forget!**

- Other causes of pyrexia in pregnancy e.g. Group A strep, chorioamnionitis
- Other causes of SOR/cough including PE, pulmonary oedema

**Contact numbers**

- Complete maternity VTE assessment for every pregnant woman
- N.B. LMWH doses are different in pregnancy (any trimester)

*PCR – protein/creatinine ratio
APPENDIX 3

Example of Labour Ward Care Pathway for Suspected/Confirmed COVID-Positive Patient

The Designated COVID Rooms =

ON ADMISSION OF A SUSPECTED/CONFIRMED COVID-19-POSITIVE PATIENT
1. Inform ALL MEMBERS of Obstetric, Anesthetic and Neonatal teams
2. Obstetric Consultant to be in-house if Instrumental delivery /CS required
3. Insert IV Cannula
4. FBC, U+E, LFTs, COAG, G+S (LDH, Ferritin in COVID-Positive Patient)
5. Consideration should be given to early epidural anaesthesia

ROOM
- Minimum: Delivery Pack + Catheter Pack
- Ensure Resuscitaiare working and Neonatal SaO₂ monitor in-situ
- REMOVE all disposable equipment

CUPBOARD + TROLLEY OUTSIDE room
- Blood-form Pack
- IV Fluids + Giving Set
- Epidural Pack
- CS Pre-Med Pack
- Instrumental Delivery Equipment

MIDWIFERY
- All communication via phone
- All medical reviews, unless an emergency, must be run through the CMM
- Designated 2nd SENIOR MW to relieve for breaks/assistance

PATHWAY FOR INSTRUMENTAL DELIVERY

CALL
Alert Obstetric SpR + CMM

OUTSIDE
Labour Ward CMM
- Buddies ALL personnel entering room
- Contacts
  - Neonatal SHO to attend

INSIDE
Designated SENIOR MW + Obstetric SpR ONLY to enter room initially
Full PPE *Treat as your skin, i.e. if VE – apply sterile gloves over PPE*

DECISION INSTRUMENTAL
- CMM to remain present OUTSIDE
  - Contact Obstetric Consultant to attend
  - Make Anaesthetics/OT aware
- Neonatal SHO enters LW Room
- Anaesthetist ONLY enters LW Room if epidural top-up required
### Pathway for Emergency CS

#### CALL
Alert Obstetric SpR + CMM

#### OUTSIDE
Labour Ward CMM
- Buddies ALL personnel entering room
- Contacts
  - Anaesthetist
  - Obstetric REG + SHO
  - Neonatal REG + SHO
  - Theatre + Portering Team
  - Obstetric Consultant to attend

#### INSIDE
Designated SENIOR MW + Obstetric SpR ONLY to enter room initially
**Full PPE**
*Treat as your skin, i.e. if VE – apply sterile gloves over PPE*

#### DECISION CS
- Verbal Consent
- SpR: Ensure Urinary Catheter in situ, MW: Administer Pre-Meds
- SpR DOFFS Gown + Gloves ONLY, EXITS room to communicate plan and proceed to OT directly
- Anaesthetist ONLY enters LW Room if epidural top-up required
  - DO NOT DOFF on exit and proceed to OT directly.
- Neonatal SHO sets up Resuscitaire in OT and ensures incubator present

#### TRANSFER OT
**BY** 2 MW in Room *DO NOT doff* + Porter
**VIA** corridor (as sign-posted)
**AFTER** patient transfers onto bed in OT, LW bed is returned to LW Room by Porter in full PPE. Porter DOFFS there with buddy.

#### OUTSIDE OT
1 **Theatre Nurse** to facilitate communication/equipment requests/buddy

#### INSIDE OT
- **Full PPE: DON + DOFF as per signage, into designated bins**
- **USE CLOSED LOOP COMMUNICATION**
- 2 Anaesthetists
- 1 Anaesthetic Nurse
- 1 Obstetric SpR
- 1 Obstetric Assistant (SHO/REG)
- 1 Scrub Nurse
- 1 Labour Ward Midwife (MN-CMS/Scribe)
- 1 Labour Ward Midwife or Theatre Nurse to Circulate/Take Baby

#### NEONATOLOGY
See Separate Pathway
- **GA**
  - **Intubation** MINIMAL personnel to be in OT @ MAXIMAL distance
  - **Extubation** ALL staff + baby OUT, except Anaesthetic OT Team

#### RECOVERY + TRANSFER OUT
 Recover in OT
 Transfer to COVID-19 isolation ward by ward Staff +/- Porter

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Dr Noirin Russell, CUMH, 31032020
**APPENDIX 4**

**Example of Neonatal Delivery Pathway**

**Neonatal Delivery Pathway**

1. **COVID 19 Positive or Suspected** Mother to be delivered identified in Delivery Room (DR) or Theatre.

2. Contact Neonatal COVID SpR/Registrar (availability; contact numbers)
   or
   Neonatal SpR/Registrar on Call outside of these times.

3. Midwifery Staff ensure resuscitare in DR/Theatre fully equipped and working.


5. In units in which delayed cord clamping is usually recommended, clinicians should consider whether this practice should be continued. The most recent RCPCH/BAPM guidance states that deferred cord clamping is still recommended provided there are no other contraindications.

6. Management of the Baby following delivery dependent on clinical outcome and gestation. Refer to Table below for further recommendations.
<table>
<thead>
<tr>
<th>Outcome</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| Well Term Baby No ongoing support and normal examination. | ● Skin to skin contact recommended BUT only after mum has recovered and is able to sit up with both gloves and surgical mask on.  
● Baby can remain on resuscitaire until mum able to initiate skin to skin. Dry, dress, wrap and monitor as per routine care on Resuscitaire without additional overhead radiant warmer support.  
● When mum stable, baby to be moved to Incubator brought into DR/Theatre and brought in this incubator for ongoing care on (isolation ward) in this incubator. Incubator remains switched off and used as physical isolation device only. Ideally baby transfer should precede the transfer of mum. Contact precautions using Apron, Gloves and Surgical Mask recommended for the transfer of the baby in the incubator. Anticipate baby transfer will be by receiving Staff Midwife on ward with Porter. This Staff Midwife then waits with baby in incubator on ward to accept handover of mother and infant when mother transferred up to ward immediately afterwards. |
| Transitioning Baby e.g. -  
- Mild respiratory distress  
- Perinatal Stress (Low Cord Gases.) | ● Following initial resuscitation and stabilisation on Resuscitaire, baby placed in heated incubator brought into DR/Theatre and observed by midwifery staff who will monitor mother and baby.  
● Follow up review by Neonatal COVID SpR/Registrar in DR/Theatre at an appropriate time from delivery prior to transfer of mother.  
● If clinical concern resolved prior to review, (e.g. respiratory distress now settled), Neonatal COVID SpR/Registrar informed - follow up review not required.  
● If no ongoing concern for the baby following review, they are stable for transfer in incubator as outlined with the well-baby pathway. Incubator is switched off and used as physical isolation device only.  
● If following review by neonates, a decision is made for admission to NNU, the Neonatal COVID SpR/Registrar will transfer baby in incubator to the designated area in NNU ICUB in full PPE.  
● An extra midwife will be required to facilitate the transfer of the baby in incubator. She will remain outside DR/Theatre and only assist with transfer when baby in incubator removed from DR/Theatre. Contact precautions using Apron, Gloves and Mask adopted by this assisting Midwife for this transfer.  
● Upon arrival to NNU ICU, the Neonatal COVID SpR/Registrar will partially DOFF, removing gloves and gown only. Glasses and Mask should remain on as these will be required again whilst carrying out further procedures upon arrival of baby. |
| Unwell Baby e.g. Preterm Delivery / Asphyxiated Baby / Severe HIE | ● Neonatal COVID SpR/Registrar, +/- Consultant in attendance and in full PPE.  
● Following stabilisation of baby, transfer to NNU ICU (Designated COVID-19 area) on open resuscitaire.  
● Neonatal Team to transfer baby in full PPE. Doors will need to be opened by labour ward staff to facilitate transfer to NNU ICU.  
● Upon arrival to NNU ICU, neonatal team to partially DOFF, removing gown and gloves only. Glasses and Masks to remain on until all procedures carried out. |
| Multiple Pregnancy | ● Recommendations as described above.  
● Separate incubators required for each baby whilst baby recovering and also during transfer to (isolation ward) or NNU. |
**APPENDIX 5**

**VTE Prophylaxis Protocol**
for In-Patients aged 16 or Over with COVID-19 or Medical Conditions

Assess all patients as soon as possible (within 14 hours) after the decision to admit. Reassess at consultant review and if clinical condition changes.

### Step 1: VTE risk assessment: VTE risk factors

<table>
<thead>
<tr>
<th>Padua score</th>
<th>VTE risk factors continued</th>
<th>Padua score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confirmed COVID-19</td>
<td>At risk, proceed to step 2</td>
<td></td>
</tr>
<tr>
<td>Presumed COVID-19</td>
<td>At risk, proceed to step 2. Assess according to Padua Prediction Score (only if not COVID-19)</td>
<td></td>
</tr>
<tr>
<td>Immobility expected for at least 3 days (confined to bed +/– bathroom)</td>
<td>3</td>
<td>Significant heart, metabolic, endocrine, respiratory disease</td>
</tr>
<tr>
<td>Active cancer or treatment (chemo-or-radiotherapy within 6 months or metastases)</td>
<td>3</td>
<td>Acute infection or Acute or chronic inflammatory disorder</td>
</tr>
<tr>
<td>Previous DVT/PE</td>
<td>3</td>
<td>Ischaemic stroke or Acute MI</td>
</tr>
<tr>
<td>Thrombophilia</td>
<td>3</td>
<td>Aged 70 or over</td>
</tr>
<tr>
<td>Taking oestrogen-containing contraceptive or HRT</td>
<td>1</td>
<td>Surgery in previous 30 days</td>
</tr>
<tr>
<td>BMI 30 or greater (obese)</td>
<td>1</td>
<td>Pregnant or up to 6 weeks post-partum*</td>
</tr>
</tbody>
</table>

*Patients with COVID-19: all patients are at risk of VTE; proceed to step 2.
*Medical patients: Padua Prediction Score 4 or greater = at risk of VTE; proceed to step 2. Padua Prediction Score 3 or less = at low risk of VTE; no prophylaxis required.
*Pregnant or post-partum: Medical admission = at risk of VTE. Maternity = follow maternity guidance.

### Step 2: Bleeding risk assessment

**Active bleeding**
- Platelets less than 30 x 10^5/L in COVID-19
- Platelets less than 50 x 10^5/L in other medical patients

**Bleeding disorder**, e.g. haemophilia, Von Willebrand's

**Acquired bleeding disorder**, e.g. liver failure with PT over 15

**Acute stroke (discuss with stroke team)**

**Blood pressure 230 systolic or 120 diastolic or greater**

Any risk factor above = contra-indication (C/I) to low molecular weight heparin (LMWH) or heparin

### Step 3: Recommended prophylaxis

#### Pharmacological prophylaxis

<table>
<thead>
<tr>
<th>All patients</th>
<th>Adequate hydration, early mobilisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-risk: COVID-19 or Medical patient with Padua score 4 or greater And no C/I to heparins</td>
<td></td>
</tr>
<tr>
<td>Weight 50-100 kg and GFR over 30 mL/min</td>
<td>Tinzaparin 4500 units or enoxaparin 40 mg once daily</td>
</tr>
<tr>
<td>Weight 101-150 kg</td>
<td>Tinzaparin 4500 units bd or enoxaparin 40 mg bd</td>
</tr>
<tr>
<td>Weight less than 50 kg</td>
<td>Tinzaparin 3500 units</td>
</tr>
<tr>
<td>GFR less than 30 mL/min</td>
<td>Enoxaparin 20 mg once daily</td>
</tr>
</tbody>
</table>

#### Mechanical prophylaxis

**COVID-19 patient or**
- Medical patient with Padua score 4 or greater
- With contra-indication to heparins
  - Anti-embolism stockings +/+ intermittent pneumatic compression devices (IPCD)/y foot pumps
  - Do not use in suspected or proven peripheral arterial disease, severe dermatitis, massive leg oedema, leg deformity preventing correct fit, peripheral neuropathy, recent skin graft, allergy to fabric or acute stroke. Use caution and clinical judgement if applying stockings over venous ulcers or wounds.
  - Use IPCD if available, particularly in COVID-19 or acute stroke.

**COVID-19 patient**
- Consider IPCD in addition to low molecular weight heparin in patients with COVID-19 considered to be at high risk of VTE, if IPCD available.

#### Low-risk medical (score 3 or lower)
- No heparin or low molecular weight heparin
- Duration: local decision; e.g. until low-risk or until discharged. May consider case-by-case prolonged prophylaxis.

### Step 4: Inform the patient about the signs and symptoms of VTE. Prescribe appropriate prophylaxis.

**Step 5:** As part of the discharge plan, give patients (and family members/carers if appropriate) verbal information and the patient alert card. Give those discharged with prophylaxis information about how to use it effectively and safely and notify their GP.

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*References:*
- [https://rhfprocessing.org/appendix-h-f-appendix-5](https://rhfprocessing.org/appendix-h-f-appendix-5)
- Updated 18th April 2020

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