ISUOG Consensus Statement on organization of routine and specialist obstetric ultrasound services in the context of COVID-19

INTRODUCTION

This statement is intended for doctors and staff working in routine, high-risk and specialist obstetric ultrasound services offering care to pregnant women. Ultrasound investigation is an essential part of care in these areas.

Routine and specialist obstetric ultrasound scans are an important part of prenatal care that need to be maintained despite the ongoing coronavirus disease 2019 (COVID-19) pandemic with all its associated comorbidities[1].

This document is not a guideline for clinical management but a consensus statement from international experts, which provides proposals and options for managing patient workflows and clinical pathways in the context of COVID-19, that can be adapted to different countries and individual units based on their resources and infrastructure. Appropriate use of personal protective equipment (PPE), hygiene, and disinfection of ultrasound transducers, equipment and the ultrasound room have been addressed in separate documents[2,3].

Women and their unborn babies should be provided with clinically safe and evidence-based care, and specifically the use of ultrasound diagnostics based on existing guidelines. During the COVID-19 pandemic, every attempt should be made to minimize patient visits to safeguard patients and staff, particularly when staff shortage due to self-isolation policies is impacting workflow in the ultrasound unit.

The basic principles in a situation of pandemic are:

1. Medical resources should be spared and prioritized.
2. Maximum care should be taken to avoid unnecessary exposure of medical personnel to (potentially) infected patients and vice versa. The risk of infection is particularly high during ultrasound investigation due to the impossibility to keep a protective distance (2 meters or 6 feet) between the woman and her caregiver.
3. The number of visits should be reduced to the essential minimum and women should be advised to attend with no accompanying person to avoid virus spread.

GENERAL GUIDANCE

All women in need of care should be triaged based on their symptoms and infection status. The first step is to identify patients who are clearly or likely infected by the virus and those who are (supposedly) not infected, keeping in mind that there is increasing evidence that a large proportion of infected people may have no symptoms[1,4]. Our recommendation is that every woman is screened (via a questionnaire) for COVID-19 before she enters the ultrasound unit.

Many healthcare services have created dedicated COVID-19 triage services in which symptomatic patients can be assessed and, if necessary, tested for their infection status even before physically entering the hospital. If the symptomatic patient is pregnant, she should be assessed by her assigned care provider in accordance with local guidelines.

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If such a triage service is not available or if the patient is not symptomatic, it is important that the woman is appropriately screened for symptoms and risk factors based on travel, occupation, contact and cluster (TOCC)[2] before attending for an ultrasound scan, as described below.

Scheduling and organizing appointments

Appointments scheduled before the onset of the emergency situation:

- In case of local restrictions and/or staff shortage, postponing or canceling all non-urgent scans for (at least) 14 days should be considered. Appointments may be rescheduled and organized according to the recommended schemes of essential care (see below).
- A review of the clinical urgency of the existing appointments should be made by the medical team on a weekly basis, depending on the local restrictions, staff availability, gestational age and indications.
- In case of postponement of a non-urgent appointment, the patient should be advised by phone that her pregnancy care will not be compromised but will be modified to keep her and her baby safe during the COVID-19 outbreak.
- If a patient has been exposed to the virus or is known to have been infected, she should be advised not to attend the hospital and to self-isolate for 14 days based on local and national guidelines. Close communication with the woman should be arranged in order to monitor her situation.

Scheduling new appointments:

- All appointments should be booked by telephone or online rather than onsite.
- Staff scheduling appointments should be instructed to follow strictly the guidance regarding scan indication and priority and, in case of doubt, they should consult a physician.
- Appointments should be spaced out to avoid crowding of the waiting room and patients should be advised to attend with no accompanying person. Staff should reassure the patient that a physician would be available to consult with her and her family members by teleconference if she wishes.
- We recommend that a dedicated administrator, assisted by a physician, contacts each patient 1 day prior to her scan appointment to screen her for symptoms and significant TOCC risk factors. In case of symptoms and/or positive TOCC, the appointment should be rescheduled according to the prioritization scheme for at least 2 weeks later.
- If Telehealth technology is in place, in order to maximize the capacity of the workforce, quarantined staff may be able to prescreen patients the morning of the ultrasound appointment for TOCC risk factors and symptoms. In case of need to reschedule/cancel an appointment, they should provide reassurance to the patient that this will not negatively impact her wellbeing and that of the fetus.
- Where virus carriage is common in the community, consideration should be given for patients to wear surgical facemasks when they visit the unit.
- Patients should be referred to the ISUOG Patient Information Leaflet (https://www.isuog.org/clinical-resources/patient-information-series/patient-information-covid-19-and-pregnancy.html) about COVID-19 and pregnancy, and any other relevant local patient information.

Creation of ultrasound unit isolation room

- Hospitalized patients with suspected/probable/confirmed COVID-19 infection who need an obstetric or specialist ultrasound examination should preferably be evaluated and scanned at the bedside. Outpatients with suspected/probable/confirmed COVID-19 infection in need of a scan in the ultrasound unit should be scanned in a dedicated isolation room with a bathroom close by, and the scan should be performed by an experienced sonographer/sonologist.
    - Recommendations of the ISUOG Safety Committee should be followed for safe performance of obstetric and gynecological scans and equipment cleaning in the context of COVID-19 pandemic[3]. Ideally, dedicated equipment should be used for patients with suspected/probable/confirmed infection. These include: a dedicated ultrasound machine, dedicated transducers, preferably single-use gel packs, where available, instead of gel bottles, gloves and disposable equipment for invasive procedures.

On arrival for the scan

On their arrival to the triage station outside the ultrasound unit, women should be asked about onset of any symptoms and TOCC risk factors. A temperature check should be undertaken.

If a woman presents for their scan appointment with symptoms, such as cough, high temperature or shortness of breath, and she has not been through the dedicated triage services before attending the obstetric/specialist ultrasound unit, she should be sent to the dedicated COVID-19 room for obstetric patients according to local protocols for management of COVID-19 infection, or be evaluated by a senior member of staff in a single room specially equipped for the purpose.

OBSTETRIC CARE

This consensus statement addresses prioritization of the use of ultrasound in obstetric care during the COVID-19 outbreak. The proposed options for managing appointments and clinical pathways will need to be customized by each individual unit, depending on local protocols and guidelines, staffing and infrastructure.

The goal is to continue using ultrasound diagnostic capabilities where indicated, while reducing the use to the essential minimum and to patients with urgent indications.

General guidance on triage of pregnant women in need of ultrasound assessment

The obstetric scan provides critical information that impacts timely management of mothers and fetuses by identifying at-risk pregnancies, and provides timely workup and care for optimal outcomes. Particularly in a pandemic, it also serves as a powerful tool to provide reassurance to the patient and her family as to the wellbeing of the fetus.

There are various guidelines nationally and internationally[5–8] on the number and timing of scans. As such, the local guidelines and practices, as well as staff availability, should be kept in mind during decision-making about the frequency and timing of scans and clinical management, and when triaging patients.

If the staff in an obstetric ultrasound unit develop any symptoms of COVID-19, there is likely to be a significant impact on the resources and capacity of the unit, which will lead inevitably

to a substantial reduction in the number of scan appointments available. Therefore, there is a need for a three-tiered recommendation pathway to prioritize scans based on the type of scan and indications, according to the following options (Figure 1):

1. Scans that need to be undertaken without delay;
2. Scans that can be delayed for a few weeks without affecting clinical care;
3. Scans that can be canceled for the duration of the pandemic.

A distinction should be made between scans that are:

1. Part of routine ultrasound practice (first or second trimester);
2. Needed in view of an increased *a-priori* risk, such as for structural and genetic anomalies and placental insufficiency (pre-eclampsia, fetal growth restriction), prior preterm delivery and maternal conditions;
3. Needed in view of risk factors emerging during pregnancy (Figure 2).

Ultrasound examinations should be carried out in accordance with the ISUOG guidelines for performing first- and second-trimester fetal ultrasound[5,9] or national and local guidelines[6,7], with the recommendation to consider saving sweeps of the anatomic regions instead of still images, to shorten the duration of the direct-contact scan time. Offline capturing of specific planes and obtaining biometric measurements should be considered. The sonologist/sonographer can adopt any technique they wish to complete the examination. An experienced sonographer/sonologist should perform the scan and no trainee should be involved.

In the context of the COVID-19 pandemic, depending on local disease prevalence and staff shortage, and based on the recommendation for social distancing, high-risk patients should be prioritized. In addition, prioritization by type of scan should be considered, with the second-trimester anatomical scan taking precedence over the first-trimester scan and growth scans performed based on coexisting and emerging comorbidities[10,11].

Specific guidance for routine ultrasound investigations in low-risk pregnancies

This guidance refers to pregnant women presenting for routine ultrasound assessment without any preexisting maternal or fetal comorbidities. The sonographic care should adhere to local guidelines and may include:

- First-trimester scan to assess pregnancy location, viability, number of fetuses and chorionicity, pregnancy dating, gross fetal anatomy and screening (aneuploidy/pre-eclampsia);
- Standard anatomical scan at 18–23 weeks to assess cardiac activity, fetal size, basic fetal anatomy and wellbeing, and placental appearance and location[5];
- Fetal growth scan in the third trimester.

In low-risk patients, consider the schedule presented in Table 1, depending on whether they are asymptomatic for COVID-19 infection or symptomatic and/or screen-positive for TOCC risk factors at the time of the scheduled appointment.

Table 1 Modification of routine sonographic examinations in women at low obstetric risk, according to whether they are asymptomatic for COVID-19 infection or symptomatic and/or screen-positive for TOCC risk factors

Scan	Asymptomatic	Symptomatic and/or screen-positive for TOCC
11 + 0 to 13 + 6 weeks (also for dating)	• Combined test • Offer NIPT	• Reschedule combined test in 2 weeks if still within gestational-age window* (unless local protocols differ) • Offer NIPT/serum screening and detailed scan in 3–4 weeks after quarantine
18 + 0 to 23 + 0 weeks	• Anatomical scan	• Reschedule after quarantine in 2–3 weeks†
Fetal growth scan in third trimester	• Do not perform, unless clinically indicated	• Do not perform, unless clinically indicated

*The scan at 11–13 weeks is not advisable unless the gestational age allows for it to be performed after 2 weeks. †In countries in which there is a legal gestational-age limit for termination of pregnancy, the time limit and its implications must be explicitly explained to the patients prior to rescheduling the appointment. If a patient presents close to the gestational-age legal limit, consider offering a scan using appropriate personal protective equipment or defer for 2–3 weeks. NIPT, non-invasive prenatal testing.

Specific guidance for routine ultrasound investigations in pregnancies with preexisting or emerging comorbidities

In pregnancies with maternal indications, such as pre-eclampsia, diabetes, cholestasis, positive antibody screen, cardiovascular disease, coagulopathy, other chronic disease or prior preterm delivery, close pregnancy surveillance should be planned.

In pregnancies with fetal indications, such as positive aneuploidy screening, fetal growth restriction, suspected structural anomalies, genetic abnormalities, multiple gestation (particularly monochorionic twins) or abnormal placentation, follow-up is warranted.

In these patients, consider the scan schedule presented in Table 2, according to whether they are asymptomatic for COVID-19 infection or symptomatic and/or screen-positive for TOCC at the time of the scheduled appointment.

Table 2 Modification of routine sonographic examinations in women with preexisting or emerging comorbidities, according to whether they are asymptomatic for COVID-19 infection or symptomatic and/or screen-positive for TOCC risk factors

Scan	Asymptomatic	Symptomatic and/or screen-positive for TOCC
11 + 0 to 13 + 6 weeks (also for dating)	• Combined test • Offer NIPT	• Reschedule combined test in 2 weeks if still within gestational-age window* (unless local protocols differ) • Offer NIPT/serum screening and detailed scan in 3–4 weeks after quarantine
18 + 0 to 23 + 0 weeks	• Anatomical scan	• Reschedule after quarantine in 2–3 weeks†
Fetal growth scan in third trimester	• Reduce frequency to minimum necessary	• Reschedule as necessary‡

*The scan at 11–13 weeks is not advisable unless gestational age allows for it to be performed after 2 weeks. †In countries in which there is a legal gestational-age limit for termination of pregnancy, the time limit and its implications must be explicitly explained to the patients prior to rescheduling the appointment. If a patient presents close to the gestational-age legal limit, consider offering a scan using appropriate personal protective equipment or defer for 2–3 weeks. ‡Only reschedule if last scan is normal. If there is fetal growth restriction, schedule scan as per standard protocol.

Specific guidance for routine ultrasound investigations in women with suspected/probable/confirmed COVID-19 infection

Refer to the ISUOG Interim Guidance on the 2019 novel coronavirus infection during pregnancy and puerperium[2] and the ISUOG Safety Committee Position Statement on safe performance of obstetric and gynecological scans and equipment cleaning in the context of COVID-19[3].

Consider the following:

1. Suspected/probable cases should be treated in isolation and confirmed cases should be managed in a negative-pressure isolation room. A confirmed case that is critically ill should be admitted to a negative-pressure isolation room in an intensive care unit.
2. Staff should don appropriate PPE[2] when managing pregnant women with suspected/probable/confirmed COVID-19 infection.
3. When appropriate, a bedside scan for assessment of fetal growth, amniotic-fluid volume and umbilical artery Doppler, if necessary, can be performed. This scan should be performed by an experienced sonographer/sonologist in order to shorten the duration of the examination.
4. Pregnant women with confirmed infection or recovering from mild illness should have a growth scan 4 weeks after recovery. Follow-up scans should be scheduled according to the findings.
5. Previous studies have reported no evidence of congenital infection with severe acute respiratory syndrome coronavirus (SARS-CoV), and currently there are no data on the risk of congenital malformation when COVID-19 infection is acquired during the first or early second trimester of pregnancy. Nonetheless, a detailed morphology scan at 18–23 weeks of gestation is indicated for pregnant women with confirmed COVID-19 infection. Depending on local legal time limits for termination of pregnancy, this scan may be delayed up to 4 weeks to mitigate spread.

In women with confirmed COVID-19 infection, every attempt should be made to reschedule their appointment if they are not hospitalized. If they are hospitalized, the wellbeing of the fetus needs to be assured, as per the ISUOG Interim Guidance on COVID-19 infection during pregnancy and puerperium[2].

The suggested scan schedule presented in Table 3 may be considered in these patients.

Table 3 Modification of routine ultrasound examinations in women with suspected/probable/confirmed COVID-19 infection, according to whether they are hospitalized

Scan	Outpatient	Hospitalized
11 + 0 to 13 + 6 weeks (also for dating)	• Reschedule combined test in 2 weeks if still within gestational-age window* (unless local protocols differ) • Offer NIPT/serum screening and detailed scan 3–4 weeks following recovery	• Perform at bedside • Offer NIPT/serum screening
18 + 0 to 23 + 0 weeks	• Reschedule in 3–4 weeks following recovery†	• Perform at bedside‡
Fetal growth scan in third trimester	• Reduce frequency, with first scan 2–4 weeks after recovery	• Follow up growth every 4 weeks or earlier, based on findings

*The scan at 11–13 weeks is not advisable unless the gestational age allows for it to be performed after 2 weeks. †In countries in which there is a legal gestational-age limit for termination of pregnancy, the time limit and its implications must be explicitly explained to the patients prior to rescheduling the appointment. If a patient presents close to the gestational-age legal limit, consider offering a scan using appropriate personal protective equipment or defer for 2–3 weeks. ‡This can be a targeted scan, as if patient is critically ill it might not be possible to perform a full morphology scan.

OTHER SPECIALIST ULTRASOUND SERVICES

Different centers offer a variety of specialist ultrasound services and often routine prenatal care and sonographic services are provided in the same center. In order to minimize patient visits, every attempt should be made to schedule the specialist appointment on the same day as the routine prenatal visit/scan and to utilize Telehealth where possible, such as for genetic counseling.

In the context of the COVID-19 pandemic, depending on local disease prevalence and staff shortage, and based on the recommendation for social distancing, the following recommendations are provided based on evaluation of the benefit–risk ratio:

Monochorionic twin pregnancy appointments

1. Women should be encouraged not to miss their routine ultrasound follow-up[6].
2. In the event of critical twin-to-twin transfusion syndrome and/or selective fetal growth restriction, proceed with fetal intervention using appropriate PPE (according to symptoms, TOCC status and COVID-19 status).

Specialist preterm birth clinic appointments

For women at risk of spontaneous preterm birth:

1. If the patient is asymptomatic for COVID-19 infection without TOCC risk factors, commence appointments for cervical-length assessment at 16 weeks instead of 14 weeks, if appropriate. If the cervical length is stable at 18 and 20 weeks, discharge the patient from the clinic.
2. If the patient is symptomatic for COVID-19 infection and/or has TOCC risk factors, prescribe progesterone, if the patient is not already on it, and delay the appointment until after the period of self-isolation is complete, if appropriate.

Specialist fetal echocardiography appointments

This should be planned in consultation with a pediatric cardiologist or fetal medicine subspecialist in order to ensure that patients with the most acute need are prioritized, in accordance with the availability of personnel and to mitigate the risk of transmission. It should be kept in mind that this is a lengthy examination. If the unit has the capability to offer fetal echocardiography simultaneously with the obstetric scan, then attempts should be made to schedule one visit for both. If this is to be performed at a referral center, then consultation with that center is required.

As with the obstetric scans, a three-tiered approach may be used to prioritize emergency, urgent and elective (non-urgent) echocardiographic scans.

- Tier-1 (elective) appointments: in case of indications such as family history, assisted reproduction, multiple gestation and use of teratogenic drugs, consider delaying the appointment by 4 weeks depending on the indication (and until after a 2-week period of self-isolation if the patient has symptoms and/or TOCC risk factors, or confirmed COVID-19 infection).

- Tier-2 (urgent) appointments: for indications such as nuchal translucency thickness > 3.5 mm, history of maternal diabetes or epilepsy, consider delaying the appointment by 2–4 weeks. Use appropriate PPE if the patient is symptomatic and/or screen-positive for TOCC risk factors, or has confirmed COVID-19 infection.

- Tier-3 (emergency) appointments: in case of an extracardiac fetal defect or a suspected cardiac defect, particularly a major defect for which confirmation will greatly impact patient management, schedule an appointment immediately. Use appropriate PPE if the patient is symptomatic and/or screen-positive for TOCC risk factors, or has confirmed COVID-19 infection.

Invasive procedures

Once the fetal medicine subspecialist has established that there is an indication to perform an invasive procedure for genetic investigation, this should be performed in accordance with the ISUOG Guidelines[12], and the following considerations should be taken into account. Even though the data are limited, studies in mothers with human immunodeficiency virus, hepatitis B, hepatitis C, cytomegalovirus and herpes simplex virus have suggested a small but finite risk of vertical transmission during invasive procedures[13]. As such, caution is urged. No evidence of intrauterine infection was found in a study of nine pregnant women with COVID-19 infection in the third trimester[14], while a rapid review of studies describing women affected by COVID-19 during the perinatal period reported no case of vertical transmission among 25 pregnancies[15]. A recent research letter reported on one neonate,

born to a mother with confirmed COVID-19 infection, that tested positive for IgG and IgM antibodies despite having a negative viral nucleic acid result[16], raising the possibility of vertical transmission, but more data are needed. No data are available on fetal and perinatal complications when infection is contracted in the first and early second trimesters, a time when invasive procedures may be performed.
Given the unknown risk of viral shedding in relation to chorionic villus sampling (CVS) and the recommendation to delay evaluating patients with suspected/probable infection by 14 days, amniocentesis may be preferable instead of CVS.

Growth scan appointments

In pregnancies with indications for fetal growth scans, the frequency of the scans should be revisited and non-urgent appointments should be reduced. During the COVID-19 pandemic, considering the recommendation for social distancing and after evaluation of the benefit–risk ratio, we recommend that units should consider reducing the frequency of the fetal growth scans to one at 28 and/or 36 weeks, for the following groups:

1. Patients with gestational diabetes who are well controlled;
2. Patients with thyroid disorders who have normal thyroid function results;
3. Patients with medical disorders, such as asthma not requiring regular treatment or those with epilepsy not on treatment;
4. Those with high body mass index.

In units in which uterine artery (UtA) Doppler is measured at 20–24 weeks, growth scans for pregnancies at risk of fetal growth restriction can be triaged based on values of mean UtA pulsatility index (PI); those with normal Doppler findings should have one fetal growth scan at 32–36 weeks and those with UtA-PI > 95th percentile should have regular scans from 28 weeks onwards.

Women should be advised to monitor their blood pressure periodically and contact their care providers in case of elevated blood pressure or decreased fetal movements after 30 weeks.

Where antenatal testing is performed using a non-stress test and subsequent amniotic fluid assessment (modified biophysical profile), consider replacing this with a biophysical profile without the non-stress test, to minimize the total visit time.

Consideration of telephone consultations and remote clinics

Antenatal clinics and appointments for non-urgent risk factors can be conducted by virtual telephone consultations.

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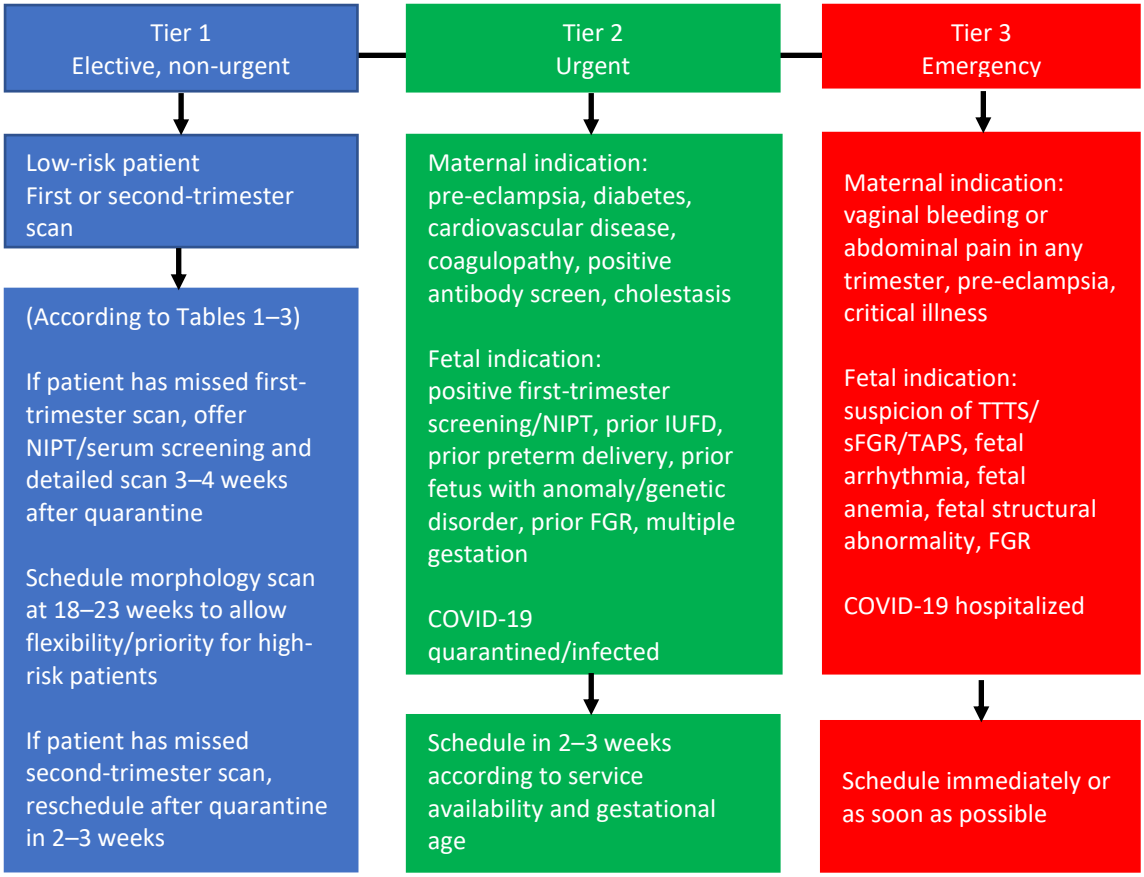
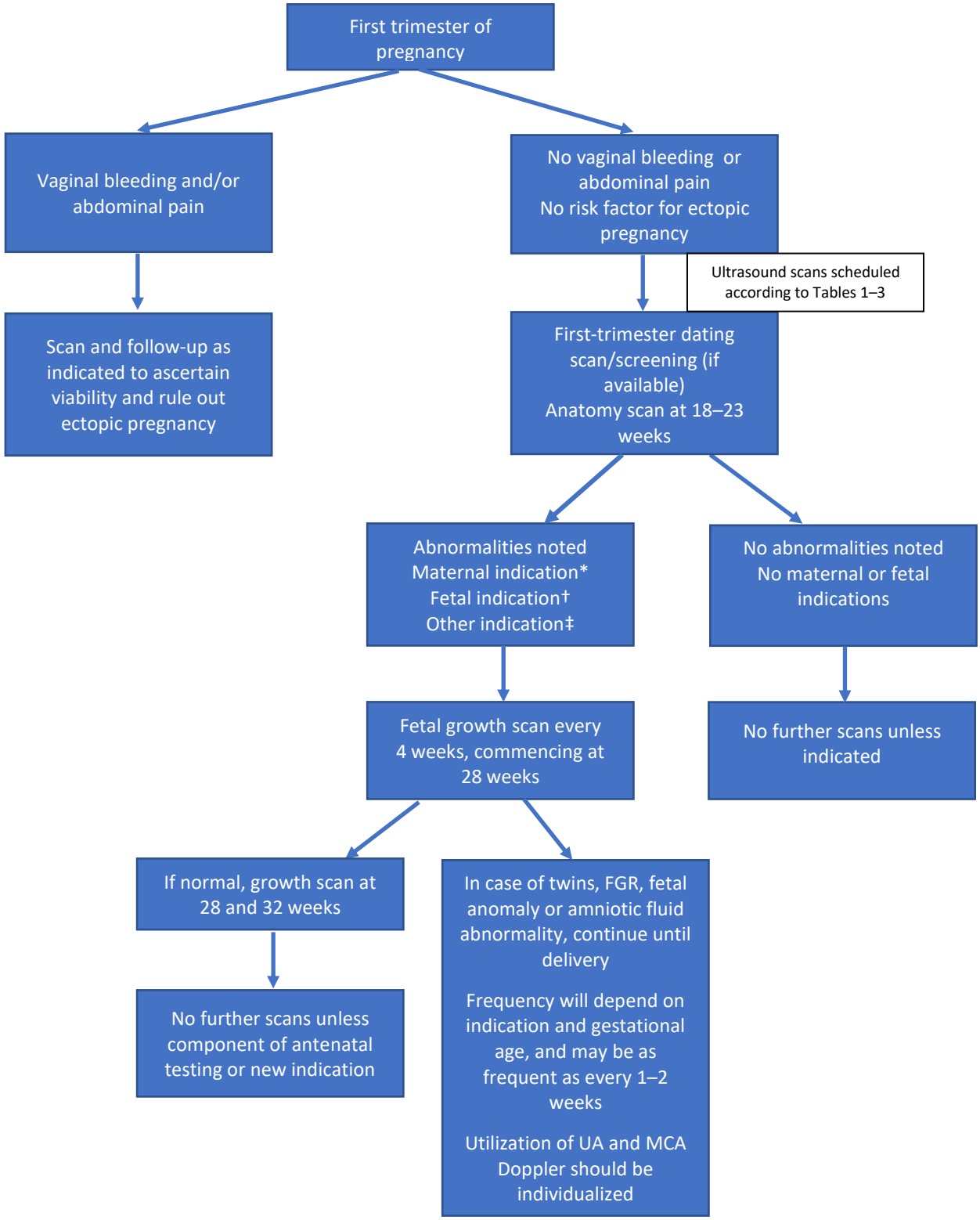
Figure 1 Algorithm for prioritizing appointments in obstetric ultrasound unit in context of COVID-19 pandemic



FGR, fetal growth restriction; IUFD, intrauterine fetal death; NIPT, non-invasive prenatal testing; sFGR, selective fetal growth restriction; TAPS, twin anemia polycythemia sequence; TTTS, twin-to-twin transfusion syndrome.

Figure 2 Algorithm for management of pregnant women in need of ultrasound assessment in context of COVID-19 infection



*Maternal indications: chronic hypertension, poorly controlled diabetes (gestational and pre-gestational), cholestasis, pre-eclampsia, cardiovascular disease, coagulopathy, positive antibody screen, other chronic disease, COVID-19 infection. †Fetal Indications: multiple gestation, prior preterm delivery, prior intrauterine fetal death, prior fetal growth restriction (FGR), fetal structural or chromosomal abnormality, FGR, fetal anemia. ‡Other indications: placenta previa, vasa previa, suspicion of placenta accreta spectrum, marginal cord insertion. MCA, middle cerebral artery; UA, umbilical artery.