

# Changed rules of ultrasound examination during the SARS-CoV-2 pandemic – guidelines of chosen countries

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**European Journal  
of Medical Technologies**

2020; 3(28): 13-18

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www.medical-technologies.eu

Published online 1.09.2020

## Abstract

COVID-19 is an infection that is caused by SARS-Cov-2 virus. This pathogen results in symptoms similar to cold, however, in the case of people who have comorbidities, for example diabetes, causing severe acute respiratory syndrome. Due to the current epidemiological situation, the recommendations of ultrasound examinations had to be changed to ensure safety for patient and medical staff in ultrasound room. World and national gynecological and obstetric organizations have amended the perinatal care standards. Before ultrasound exam, PTGiP (The Polish Society Of Gynecologists and Obstetricians) recommends performing a preliminary patients' selection. It can be done during telemedicine service: completing an online survey with questions concerning COVID-19 disease, a telephone conversation with medical staff determining a risk of infection or by completing the survey and assessing the epidemiological risk when patient appears in medical center. It is also important to remember about a protect for medical staff against infections; the examination should be safe for both the pregnant woman and the person who carry out the examination. The role of the obstetrician or midwife is to detect a potential danger as soon as possible and then to direct a patient to the proper unit deals with SARS-CoV-2 virus infections.

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## Key words:

pregnancy,  
COVID-19, ultrasound  
examination,  
perinatology,  
SARS-CoV-2

## Introduction

Pregnant women in the time of coronavirus pandemic, having a childbirth in the near future, live in fear for their health and future. Above all, this unborn child is a major aspect of the future mother's worries and anxieties. Past problems related to, for example, partner's presence during the childbirth or a design of a baby's room are becoming a minor matter. Pregnant woman, having some image of pregnancy and childbirth, must adapt to current realities.

The Polish Society of Gynecologists and Obstetricians (PTGiP) has edited the guidelines: how should a pregnant woman be admitted when there is a need for medical consultation during pandemic time. At the beginning there is a preliminary interview about current health condition, among others: occurrence of fever, muscle aches, dyspnoea, cough, weakness or contact with an infected person. When the patient does not report any symptoms, she can be referred to the gynecological and obstetric emergency room. However, when something raises doubts of a person assessing their health, the woman must go to the emergency room, which is prepared for contact with potentially infected people. This solution can minimize infections inside medical centers and hospitals. In case of only slight suspicion of COVID-19 infection, the patient is sent home, while when the threat is high, the pregnant woman is sent to a designated infectious hospital.

This pathogen results in symptoms similar to cold, however, in the case of people who have comorbidities, for example diabetes, causing severe acute respiratory syndrome. Symptoms that can be seen in most cases are: fever, dyspnoea or cough. This virus is airborne and can enter to organism through contact with the nasal mucosa, mouth or eyes. Patients are scheduled many follow-up visits throughout the pregnancy, both with the doctor and midwife. They are necessary to care for a well-being of the fetus and mother's health, and they can be opt out or postpone only after consulting with doctor. If pregnancy is normal, without anxiety symptoms, it is recommended that the visit can be carried out remotely. However, there are cases when a pregnant patient requires personal medical consultation. Then very important is

to remember about epidemiological rules that will minimize a risk of infection. Due to a small amount of studies about delivery of women infected with SARS-CoV-2 virus, it is difficult to determine an exact consequences for a subsequent parameters of the newborn baby [1].

However, a pregnant patient should remember that the current situation has the least impact on the preparation for delivery and diagnostics that is so important during this period. She should to follow the instructions of doctor taking care of pregnancy and in case of any doubts consult them. The epidemiological situation significantly affects the form of exams, including ultrasound exam. Currently, it is a need to follow the national guidelines in every country. The article discusses guidelines for the ultrasound examinations in the era of COVID-19 pandemic in Poland, The United Kingdom and the The United States of America.

## Recommendations for ultrasound examination during SARS-COV2 pandemic in Poland

The primary goal of the ultrasound exam in pregnant women is to minimize an occurrence of fetal defects and newborn baby defects in development and health condition, which are occurs as a result of not recognizing in the ultrasound exam, for example: immaturity or other intrauterine disorders. In Poland, ultrasound screening during pregnancy is offered to every pregnant woman. According to The Polish Gynecological Society, three ultrasound examinations should be performed in a normal pregnancy and fourth right before delivery- after 36 week of pregnancy. Their scope is different, and physician decides about additional examinations based on the patient's obstetric situation [2].

Due to the current epidemiological situation, the recommendations regarding ultrasound examinations had to be changed to ensure safety of both the woman and the medical staff who perform exams. Before ultrasound, it is recommended to carry out a

pre-selection of patients in connection with coronavirus. It can be done during telemedicine service : completing an online survey with questions concerning COVID-19 disease, a telephone conversation with medical staff determining a risk of infection or by completing the survey and assessing the epidemiological risk when patient appears in medical center. Only patients with a negative and asymptomatic history can be examined. If symptoms are similar to a cold without a fever, the ultrasound exam should be postponed for at least seven days. Pregnant women with a positive medical history should be quarantined for fourteen days and the examination should be delayed. In the case of patients with COVID-19 disease or a SARS-CoV-2 virus positive test, ultrasound examinations should be performed only with justified indications in centers intended for a care of patients with SARS-CoV-2 virus infection. These centers are indicated by The Ministry of Health.

To reduce exposure, the medical staff and the woman should wear a surgical mask and the ultrasound room should be ventilated several times a day. It is recommended to wear protective glasses or special helmets- face shield with faceplate by the medical staff. It is important to keeping an aseptic and anti-septic rules, among others examination in disposable gloves, washing and disinfecting hands before and after each examination and using disinfectant wipes to clean a workplace after every patient visit; ultrasound machine, medical couch.

In the case of patients infected or likely to be infected with coronavirus, ultrasound should be performed only if it is clinically necessary to determine fetal growth, AFI (Amniotic Fluid Index), and umbilical cord blood flow. All other exams, excluding emergencies, should be postponed. The number of endovaginal procedures should be minimized due to increased risk of infection transmission. Transabdominal examination is recommended to assess a cervical length. Only one patient should be in the ultrasound room and waiting room, during the examination verbal contact with the patient should be limited, a distance between the examined woman and the examiner- physician should be as large as possible. The Polish Society of Gynecologists and Obstetricians recommends that a visit time be shortened by

withdrawing from fetal DV (ductus venosus) and TV (tricuspid valve) assessment, if fetal NT (nuchal translucency) measurement is correct; this applies first trimester ultrasound [3].

## Recommendations for ultrasound examination during SARS-COV2 pandemic in the United Kingdom

In accordance with British guidelines, a pregnant woman, as well as any other patient going to any ultrasound examination, should appear there oneself. However, when situation demands it, patient may appear with a maximum one accompanying person. Before entering the emergency room at hospital, all patients are checked for symptoms that would suggest COVID-19 disease. If patient does not meet the requirements that would allow on the examination, a visit is postponed to another date. In this situation, pregnant women were given guidelines:

- register for an appointment 7 days after onset of symptoms- when she lives alone at home
- register for an appointment 14 days after onset of symptoms, if she live with other people who have symptoms; during this period, all family members should remain at home

The medical staff should inform the woman that if symptoms persist, she should not to appear for visit and she have possibility to consult with physician in order to get advice. In situation when pandemic continues, the centers and hospitals may have a huge problem and there will be a need to limit ultrasound. Therefore, in the guidelines we can find a record saying that: if there will be a necessity to perform only one ultrasound examination during pregnancy, it should be performed during the 18-20 weeks of pregnancy with additional option of doing quadruple test for women who want to know if fetus may have a trisomy of 21 chromosome pairs. For pregnant women wishing to perform a screening test for trisomy 21, 18, 13 chromosome pair, which should be done between 11 and 14 week of pregnancy and because of epidemiological reasons it is not possible to do it, the

quadruple test should be performed. Between 18 and 20 weeks of pregnancy, the ultrasound examination and the quadruple test for trisomy 21 chromosome pairs can be performed. However, between 20 and 23 weeks of pregnancy, it is suggested to perform only test for trisomy 18 and 13 of a chromosome pair. In the case of absence on the ultrasound examination, first of all blood tests should be performed to detect genetic anomalies (between 18 and 23 weeks of pregnancy) and secondly important is screening tests (between 11 and 14 weeks of pregnancy). If, for some reason, an ultrasound examination cannot be performed, woman can do the quadruple test, between 14 and 20 weeks of pregnancy, based on the date of her LMP (last menstrual period). Despite the fact that the quadruple test with ultrasound result is better than without scanning, in this case it is acceptable to perform [4].

In The United Kingdom a research was created which is shortened form of the HTA report (Health Technology Assessment)- a systematic review. Report concerns the analysis of health policy and methods of functioning of healthcare for pregnant patients who were affected by effects of SARS-CoV-2 infection. Aspects which were discussed in the article are: pregnant woman's blood test and exam results, early period pregnancy, pregnancy loss in the second/ third trimester, prematurity, fetal growth and placental influence, delivery and postnatal period as well as newborn blood test and exam results. Research published in PubMed and MedRxiv bases allowed for scientific description of guidelines with representatives of The Royal College of Pediatrics and Child Health (RCPCH) and Royal College of Obstetricians and Gynaecologists (RCOG), which in turn allowed for supplementation of data previously missing. From many results in PubMed and MedRxiv, 23 were selected which were case reports or series of case reports. The research group consisted of 32 women, who developed COVID-19 symptoms during pregnancy. Only 2 women had serious complications that required intensive care. To this time, no mothers' deaths have been recorded and the most popular method of ending pregnancy was cesarean section. Comparing SARS and MERS, COVID-19 seems to be less mortal. Although, due to

a small number of cases reported, no bold conclusions can be made [5].

## **Recommendations for ultrasound examination during SARS-COV2 pandemic in the United States of America**

The American College of Obstetricians and Gynecologists (ACOG) encourages pregnant women to take precautions to avoid exposure to SARS-CoV-2 infection, although, according to current research, pregnancy does not affect on increased risk of infection or severe disease compared to the general population. ACOG recommends to conduct initial verification and assessment of infection's by telephone or online interview with patient prior to medical visit so that medical centers can be properly prepared and optimized. Health care professionals should follow the policies of their healthcare facility and the policies of the local and state health department. The United States has implemented community actions to control spread of COVID-19 virus. These efforts are important but may lead to a reduction a number of services provided to pregnant patients. Obstetrician-gynecologists and other obstetric care workers should continue to provide medically necessary prenatal care, referrals for examinations and consultations, although modifications in healthcare methods may be needed. SARS CoV-2 infection is highly contagious and this should be considered when there is planned perinatal care for the patient. All medical staff dealing with potential or confirmed cases of COVID-19 disease patients should use personal protective equipment. It is also important to train all medical staff to safely put on and remove personal protective equipment. ACOG recommends wearing face masks by medical staff during contact with patients. When there is near exposure on contact with patient's expiratory air, it is necessity of using N95 face mask or other face masks which provide a higher level of protection instead of usual face mask without filters and protections. Protective goggles or a disposable

face shield with faceplate that covers front and sides of a face is necessary for staff who have contact with patients infected or suspected of being infected. After entering patient's room at hospital or examination room, there is necessity to wear clean, non-sterile disposable gloves and clean insulation apron [6].

## Lungs ultrasound exam in pregnant women with suspect of SARS-COV-2 infection

During the SARS-CoV-2 pandemic, pregnant women may need lung x-rays due to respiratory symptoms, but it is extremely important to ensure their and fetus safety at the highest level. In pregnancy a non-radioactive test method for assessing lungs is important, so the best way to examine lungs is ultrasound. It is worth to remember that a doctor with radiology specialization is not always needed for ultrasound of lungs. A much more convenient solution for obstetricians and gynecologists would be to simultaneously perform an ultrasound scans of fetus and then an assess of lungs to confirm or exclude pathology condition and immediate evaluation by another specialist like a pulmonologist. The current standard in the diagnosis of coronavirus infection is respiratory swab. However, frequent errors in swabbing procedure requires repeated swab from nasopharynx. Hence, it is a technique that is characterized by a large number of false negative results. Therefore, some patients who are infected with the virus can pass on pathogens as a result of delayed diagnosis. Computed tomography (CT) is the main tool used to diagnose COVID-19 patients, however, in pregnant women the lung ultrasound examination is chosen method because of safety. It can now be considered as an "extension" of traditional abdominal ultrasound performed during pregnancy. The exam can be performed both in a lying and sitting position, then back surface of chest should be examined with the transducer. The examination should to include entire surface of lungs, for this purpose four vertical lines should to be appointed and exam have to be made between them:

left middle axillary line, right middle axillary line, left parasternal line, right parasternal line. The examination should be safe for both the pregnant patient and the person who conducts the examination. The task of the obstetrician or radiologist is to detect a potential threat as soon as possible and then to direct to appropriate infectious hospital [7].

## Summary

Pregnancy is a period full of emotions and impressions but the current epidemiological situation makes this time extremely difficult and sometimes causes new problems. One of aspects important for mother and baby's health is access to diagnostic tests and exams. They are necessary in caring for well-being of the fetus and should be available to patients during the SARS-CoV-2 virus epidemic. A pregnant woman should follow the guidelines that will protect her and her unborn baby. Ultrasound examinations should still be carried out according to planned dates and, in case of complications, pregnancy threatening physician have to be informed in order to perform second examination as soon as possible. First of all, it should be remembered that responsibility for the baby's health lies in the mother's hands and she should take care for participation in examinations.

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