Organization of an obstetrics unit during the COVID-19 pandemic: a short literature review

Cristina Zanardini, Marta Papaccio, Roberta Castellani, Rossana Orabona, Nicola Fratelli, Anna Fichera, Laura Franceschetti, Federico Ferrari, Franco E. Odicino, Enrico Sartori, Federico Prefumo

Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia
Viale Europa, 11, 25123, Brescia, Italy
Division of Obstetrics and Gynaecology, ASST Spedali Civili
Ple Spedali Civili, 1, 25123, Brescia, Italy

Abstract

The coronavirus disease 2019 (COVID-19) pandemic has posed unprecedented challenges for the delivery of high-quality obstetric services to both SARS-CoV-2 positive and negative women. The initial epidemiological pressure, especially in the most affected areas of China and Italy, led the local health services to defining care pathways based on the organizational and logistical availability of the moment. Currently, some aspects of clinical care practices and the management of women with suspected or confirmed SARS-CoV-2 virus infection are well established. The aim of this review article is to provide an outline of the suggested organization of obstetric units during the COVID-19 pandemic, and to mention the challenges we had to face at our institution.

Keywords: pneumonia; pregnancy; delivery; antenatal care; SARS-CoV-2; COVID-19

MeSH terms:
PREGNANCY COMPLICATIONS, INFECTIOUS – THERAPY
COVID-19 – COMPLICATIONS
COVID-19 – THERAPY
DELIVERY OF HEALTH CARE – ORGANIZATION & ADMINISTRATION
MIDWIFERY – ORGANIZATION & ADMINISTRATION

For citation: Zanardini C., Papaccio M., Castellani R., Orabona R., Fratelli N., Fichera A., Franceschetti L., Ferrari F., Odicino F.E., Sartori E., Prefumo F. Organization of an obstetrics unit during the COVID-19 pandemic: a short literature review. Sechenov Medical Journal. 2021; 12(2): 12–19. https://doi.org/10.47093/2218-7332.2021.12.2.12-19

CONTACT INFORMATION:
Federico Prefumo, MD, PhD, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia.
Address: Viale Europa, 11, 25123, Brescia, Italy
Tel.: +39 030 399 5341
E-mail: federico.prefumo@unibs.it

Conflict of interests. The authors declare that there is no conflict of interests.
Financial support. The study was not sponsored (own resources).

Received: 20.08.2021
Accepted: 29.08.2021
Date of publication: 29.09.2021
Организация работы акушерского отделения во время пандемии COVID-19: краткий обзор литературы

К. Занардини, М. Папаччо, Р. Кастеллани, Р. Орабона, Н. Фрателли, А. Фичера, Л. Франческетти, Ф. Феррари, Ф.Э. Одичино, Э. Сартори, Ф. Префумо

Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук,
Университет Брешиа
пр-т Европы, 11, 25123, Брешиа, Италия
Отделение акушерства и гинекологии, Гражданская Больница Брешиа
Пьяццале Спедали Чивили, 1, 25123, Брешиа, Италия

Аннотация
Пандемия новой коронавирусной инфекции (COVID-19) создала беспрецедентные проблемы для оказания высоко-качественной акушерской помощи женщинам как с положительным, так и с отрицательным результатом на SARS-CoV-2. В наиболее пострадавших от первой волны эпидемии районах Китая и Италии местные службы здравоохранения определили пути оказания помощи в зависимости от организационных возможностей и материально-технической оснащенности на тот момент времени.

В настоящее время хорошо изучены некоторые аспекты оказания медицинской помощи и ведения женщин с подозрением или подтвержденной вирусной инфекцией SARS-CoV-2. Цель этой обзорной статьи – представить схему организации работы акушерских отделений во время пандемии COVID-19 и упомянуть проблемы, с которыми нам пришлось столкнуться в нашем учреждении.

Ключевые слова: пневмония; беременность; роды; дородовый уход; SARS-CoV-2; COVID-19

Контактная информация:
Федерико Префумо, MD, PhD, отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа.
Адрес: пр-т Европы, 11, 25123, Брешиа, Италия
Тел.: +39 030 399 5341
E-mail: federico.prefumo@unibs.it

Конфликт интересов. Авторы заявляют об отсутствии конфликта интересов.
Финансирование. Исследование не имело спонсорской поддержки (собственные ресурсы).

Поступила: 20.08.2021
Принята: 29.08.2021
Дата печати: 29.09.2021

List of abbreviations
SARS-CoV-2 – severe acute respiratory syndrome coronavirus 2
The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, a global public health emergency, has had major effects on the provision of healthcare services worldwide. It also had a major impact on obstetric services. From the very beginning of the pandemic, it became clear that care pathways and the assistance network of pregnant women, mothers, fathers and newborns needed a timely review and reorganization. In January–March 2020, however, the scientific evidence was still scarce and often ambiguous. The initial epidemiological pressure, especially in the most affected areas of China and Italy, led the local health services to defining care pathways based on the organizational and logistical availability of the moment. Currently, some aspects of clinical care practices and the management of women with suspected or confirmed SARS-CoV-2 virus infection are well established. The aim of this article is to provide an outline of the suggested organization of obstetric units during the coronavirus disease 2019 (COVID-19) pandemic, and to mention the challenges we had to face at our Institution.

**ANTENATAL CARE**

The presence of asymptomatic or paucisymptomatic (subclinical) SARS-CoV-2 virus positive subjects has been documented in both the general population and pregnant women, many of whom generally have mild or moderate symptoms [1]. The prevalence and clinical manifestations of COVID-19 disease in pregnancy appear to be substantially similar to the general population. All women, even those positive for the SARS-CoV-2 virus, should be enabled to participate in the choices related to their care, in line with the principles of informed consent [2]. Assistance must be centered on women, respectful and qualified in order to preserve dignity, privacy and confidentiality and allow an informed choice. The presence of a person chosen by the woman must also be guaranteed throughout the birth process. In case of low-risk pregnancy it is recommended to maintain the minimum prenatal visits in presence according to local guidelines and, when possible, to include the visit, the ultrasound examination, and any other diagnostic tests in a single appointment, taking care to involve the minimum number of healthcare professionals. In the event of a high-risk pregnancy, some women, due to their medical or obstetric clinical conditions, comorbidities or complications, may require a greater number of visits and multidisciplinary assistance [2].

At the end of each appointment, it is advisable to book the next appointment and its modality (in presence or remotely). Multidisciplinary assistance must include anesthetic evaluation, which is also useful for providing comprehensive information on the safety of the care pathway and to offer analgesia at childbirth. There should be a recovery system for women who are unable to attend appointments for more than three consecutive weeks. Before accessing health services, women should be triaged to detect any symptoms suggestive of SARS-CoV-2 virus infection, including their household members. Several triage checklists have been suggested [3, 4]. Pregnant women who have had contact with a person with confirmed SARS-CoV-2 infection should be carefully monitored considering the possibility of transmission from asymptomatic individuals.
ULTRASOUND EXAMINATIONS

The screening ultrasound examinations recommended in low-risk pregnancy must be performed with the timing and modalities suggested by local or international guidelines [5–7], both in asymptomatic patients and in patients with suspected/confirmed SARS-CoV-2 infection or with reported close contacts with individuals with confirmed or suspected infection within the last 14 days. Non-urgent and/or deferrable ultrasound examinations in patients with suspected/confirmed SARS-CoV-2 infection or with reported close contacts in the last 14 days should be postponed for 14 days.

In areas with a high incidence of SARS-CoV-2 infection, the planning of ultrasound activities must be reviewed on a weekly basis and possibly rescheduled taking into consideration the epidemiological situation, the availability/unavailability of operators and the gestational age and indication of the ultrasound examinations. In the event that the planning manager deems it advisable to defer a non-urgent ultrasound examination, the patient must be informed by telephone that the postponement of the examination does not substantially change the monitoring of pregnancy, and that the choice to defer the ultrasound examination is dictated by the need to protect the pregnant woman and the fetus from the ongoing epidemic. The ultrasound planning must provide sufficient time for the spacing of the appointments so that each ultrasound examination can probably be concluded before the starting time of the next examination (minimum 30 – max 60 minutes depending on the type of ultrasound examination and the clinical indication) to minimize the possibility of waiting for more than one patient in the common areas. The scheduling/rescheduling of appointments should be done by phone, e-mail or electronic messaging. The woman must be contacted by phone one day before the scheduled appointment to verify the absence of symptoms and close contacts with individuals with confirmed or suspected SARS-CoV-2 infection in the last 14 days. Table summarizes the changes to ultrasound scheduling in low-risk pregnancies according to SARS-CoV-2 status as suggested by the International Society for Ultrasound in Obstetrics and Gynecology [8].

Table. Modification of routine sonographic examinations in women at low obstetric risk, according to whether they are asymptomatic for COVID-19 or symptomatic and/or screen-positive for TOCC factors (reproduced with permission from [8])

| Scan / Исследование | Asymptomatic / Бессимптомные | Symptomatic and/or screen-positive for TOCC / Наличие симптомов и/или положительные результаты скрининга на факторы риска TOCC |
|---------------------|-----------------------------|---------------------------------------------------------------------------------------------------------------------|
| 11 + 0 to 13 + 6 weeks (also for dating) / c 11 + 0 до 13 + 6 неделя (также для определения срока беременности) | • Combined test / Офер НИПТ | • Reschedule combined test in 2 weeks if still within gestational-age window* (unless local protocols differ) |
| 18 + 0 to 23 + 0 weeks / C 18 + 0 до 23 + 0 недель | • Anatomical scan / Анатомическое сканирование | • Reschedule after quarantine in 2–3 weeksb |
| Fetal growth scan in third trimester / Сканирование развития плода в третьем триместре | • Do not perform, unless clinically indicated | • Do not perform, unless clinically indicated |

Note: TOCC – 14 days before onset of symptoms: Travel, High-risk Occupation (e.g. laboratory worker, healthcare worker, wild-animal-related work), History of unprotected Contact with individuals with confirmed or suspected SARS-CoV-2 infection or with reported close contacts with individuals with confirmed or suspected SARS-CoV-2 infection and having SARS-CoV-2 status as suggested by the International Society for Ultrasound in Obstetrics and Gynecology [8].

* – the scan at 11–13 weeks is not advisable unless the gestational age allows for it to be performed after 2 weeks.

b – in countries where there is a legal gestational-age limit for termination of pregnancy, the time limit and its implications should be explicitly explained to the patients prior to rescheduling the appointment.
A different approach must be taken for scans that are not part of the routine care of low-risk pregnancy but may be needed in view of an increased risk of complications (structural/genetic abnormalities; history of preterm delivery, fetal growth restriction or pre-eclampsia; maternal medical conditions). Sometimes, an ultrasound examination may be needed urgently because of actual maternal symptoms or pregnancy complications. The algorithm suggested by the International Society for Ultrasound in Obstetrics and Gynecology [8] for such cases is shown in Figure.

**HOSPITAL ADMISSION (TRIAGE)**

If a pregnant woman needs unplanned or urgent care, triage units should offer telephone advice, possibly providing a call-back service if the appropriate care provider is not immediately available. When medical assessment and/or hospitalization is required, local protocols are needed to ensure that women with confirmed or suspected SARS-CoV-2 infection are identified early and isolated upon arrival at the health facility. These protocols must include detailed indications for the identification, in the emergency room, of dedicated spaces, clean and protected paths, distancing and protection of accompanying persons in the waiting room. Protocols must also contain indications for the sanitation of environment and equipment, use of personal protection equipment for both the pregnant woman and staff, and instructions for the possible hospitalization and assistance offered in case of complications and/or development of critical conditions [3, 4, 9–11].

**LABOUR AND DELIVERY IN SARS-COV-2 POSITIVE WOMEN**

In the event of confirmed or suspected SARS-CoV-2 infection, a multidisciplinary team including obstetrician, anesthetist, midwife, neonatologist,
pediatric nurse and infectious disease specialist, should take care of the woman and her infant. A clear separation must be maintained between the pathways of negative women and those of confirmed or suspected SARS-CoV-2 infection. The observation and evaluation of the woman must be carried out as usual with the addition of the oxygen saturation control to be carried out every hour with the aim of maintaining it over 94%. A designated team member should regularly update the woman’s family members about her medical condition, using interpreting services when needed. In case of clinical indications, the administration of steroids for fetal pulmonary maturation is indicated as per existing protocols < 34 weeks of gestation. SARS-CoV-2 positivity does not constitute an indication for elective caesarean section [3, 4].

The mode of delivery should not be affected by the presence of COVID-19, unless the woman’s respiratory conditions require urgent delivery [9]. The choice of delivery method must be discussed with the woman, taking into consideration her preferences and any obstetric and anesthetic indications. Labor and water birth are not recommended in symptomatic women (cough, fever, general malaise) due to the hypothetical risk of transmission via feces and because protective equipment is not waterproof; it is not contraindicated in SARS-CoV-2 negative women. SARS-CoV-2 positivity in asymptomatic women is not, in itself, an indication for continuous monitoring of fetal heart rate by cardiotocography. Epidural analgesia is not contraindicated in case of SARS-CoV-2 infection and should be recommended to reduce the use of general anesthesia if an emergency caesarean section is required. Induction of labor must be evaluated on an individual basis, taking into account the possible risks and benefits. Pharmacological induction, oxytocin augmentation, and episiotomy or operative vaginal delivery must be performed not based on SARS-CoV-2 status but only if clinically justified and based on maternal and/or fetal conditions [3, 4].

Birth attendants must wear appropriate protective equipment. The choice of birth position is subject to the same assessments as in the ordinary period, not related to the COVID-19 emergency, and considering the choices of the woman. Fluid management requires careful hourly monitoring with the aim of avoiding the risk of overload that could expose women with moderate or severe clinical manifestations to an increased risk of respiratory distress syndrome. Delayed cord clamping is recommended for known health benefits to mother and infant that outweigh theoretical and undocumented risks of SARS-CoV-2 transmission.

MANAGING OBSTETRIC EMERGENCIES
Managing obstetric emergencies in a woman with suspected or confirmed SARS-CoV-2 infection poses difficulties and challenges. Personnel facing a shoulder dystocia, or a postpartum hemorrhage needs to be clinically effective and operate in safety at the same time. The use of personal protective equipment, the obstacles of working and communicating in an isolated room may hinder the performance of the obstetric team. In 2020 Cambridge University’s THIS Institute, in collaboration with the PROMPT (Practical Obstetric Multi-Professional Training) Maternity Foundation ran a rapid-response consultation involving 100 experts in human factors, obstetrics, infection prevention and control. Five key areas were identified. In order to ensure appropriate teamwork, team roles should be clearly assigned, and members should help each other to get ready; it should be clear who goes in first to attend the emergency; a ‘clean’ member of the team should not go into the patient’s room but should help colleagues to don/doff personal protective equipment, transfer equipment and laboratory samples. To improve communication between team members and with the woman and her partner, operators could wear stickers or laminated photos as role identifiers. When wearing masks, goggles/face shields and gowns, eye contact, tone of voice and body language should be emphasized to allow efficient communication. Transitions of staff and equipment between ‘dirty’ and ‘clean’ zones should be facilitated by clearly marking contaminations zones (e.g. drawing lines with red tape on the floor), using dedicated plastic bags/boxes for biological sample transfer, providing a standardized layout for personal protective equipment in the donning area supported by laminated posters showing donning/doffing steps, using wide-aperture disposal bins. Finally, the team should debrief after emergencies to provide feedback, ensure psychological safety and refine procedures.

OBSTETRIC SERVICES AT SPEDALI CIVILI DI BRESCIA
Spedali Civili di Brescia is located in the Lombardy region of Italy, which was the epicenter of the first wave of COVID-19. It is a tertiary hospital with 1,400 beds; by mid-March 2020, more than 800 beds were converted for COVID-19 inpatient care. Between the 25th February and 22nd April 2020 in Italy the incidence rate of confirmed SARS-CoV-2 infection in women who gave birth was 2.1/1,000 deliveries at national level and 6.9/1,000 in Lombardy [12]. In the period 25th February-30th June 2021, it acted as the COVID-19 obstetric hub for an area of 1.5 million inhabitants, and 288 pregnant women were admitted and/or delivered at Spedali Civili di Brescia. Common protocols were shared with the other
Lombardy COVID-19 maternity hubs [10, 11, 13, 14] with reciprocal back up in case of bed saturation. The early surge of COVID-19 in the area led to some early observations on neonatal transmission of SARS-CoV-2 [15], co-presentation of SARS-CoV-2 with other infectious diseases [16], and positive retesting after clinical and laboratory recovery [17]. Data were shared in international prospective registries [18, 19].

AUTHOR CONTRIBUTIONS
All authors: Cristina Zanardini, Marta Papaccio, Roberta Castellani, Rossana Orabona, Nicola Fratelli, Anna Fichera, Laura Franceschetti, Federico Ferrari, Franco E. Odicino, Enrico Sartori, and Federico Prefumo conceived and designed the paper, acquired analysed and interpreted the data, drafted the manuscript and critically revised it for important intellectual content. All authors approved the final version of the publication.

CONCLUSIONS
The COVID-19 pandemic has posed unprecedented challenges for the delivery of high-quality obstetric services to both SARS-CoV-2 positive and negative women. Accurate planning, flexibility in adapting to the different phases of the epidemics, and healthcare system resilience are key factors for success.

REFERENCES / ЛИТЕРАТУРА
1. Lassi Z.S., Ana A., Das J.K., et al. A systematic review and meta-analysis of data on pregnant women with confirmed COVID-19: Clinical presentation, and pregnancy and perinatal outcomes based on COVID-19 severity. J Glob Health. 2021 Jun 30; 11: 05018. https://doi.org/10.7189/jogh.11.05018. PMID: 34221361.
2. Giusti A., Zambri F., Marchetti F., et al. Interim guidance on pregnancy, childbirth, breastfeeding and the care of infants (0-2 years) in response to the COVID-19 emergency. Updating of the Rapporto ISS COVID-19 n. 45/2020. Version of February 5, 2021. Roma: Istituto Superiore di Sanità; 2021. (Rapporto ISS COVID-19 n. 2/2021).
3. Poon L.C., Yang H., Lee J.C.S., et al. ISUOG Interim Guidance on 2019 novel coronavirus infection during pregnancy and puerperium: information for healthcare professionals. Ultrasound Obstet Gynecol. 2020 May; 55(5): 700–708. https://doi.org/10.1002/uog.22013. Epub 2020 Mar 20. PMID: 32160345.
4. Poon L.C., Yang H., Dumont S., et al. ISUOG Interim Guidance on coronavirus disease 2019 (COVID-19) during pregnancy and puerperium: information for healthcare professionals – an update. Ultrasound Obstet Gynecol. 2020 Jun; 55(6): 848–862. https://doi.org/10.1002/uog.22061. PMID: 32356590.
5. Bhide A., Acharya G., Bilardo C.M., et al. ISUOG practice guidelines: use of Doppler ultrasonography in obstetrics. Ultrasound Obstet Gynecol. 2013 Feb; 41(2): 233–239. https://doi.org/10.1002/uog.12371. PMID: 23371348.
6. Salomon L.J., Alfievic Z., Bilardo C.M., et al. ISUOG practice guidelines: performance of first-trimester fetal ultrasound scan. Ultrasound Obstet Gynecol. 2013 Jan; 41(1): 102–113. https://doi.org/10.1002/uog.12342. Erratum in: Ultrasound Obstet Gynecol. 2013 Feb;41(2):240. PMID: 23280739.
7. Salomon L.J., Alfievic Z., Da Silva Costa F., et al. ISUOG Practice Guidelines: ultrasound assessment of fetal biomeory and growth. Ultrasound Obstet Gynecol. 2019 Jun; 53(6): 715–723. https://doi.org/10.1002/uog.20272. PMID: 31169958
8. Abu-Rustum R.S., Akolekar R., Sotiriadis A., et al. ISUOG Consensus Statement on organization of routine and specialist obstetric ultrasound services in context of COVID-19. Ultrasound Obstet Gynecol. 2020 Jun; 55(6): 863–870. https://doi.org/10.1002/uog.22029. PMID: 32233049.
9. Donati S., Corsi E., Salvatore M.A., et al. Childbirth care among SARS-CoV-2 positive women in Italy. In J Environ Res Public Health. 2021 Apr 16; 18(8): 4244. https://doi.org/10.3390/ijerph18084244. PMID: 33923642.
10. Ferrazzi E.M., Frigerio L., Cetin I., et al. COVID-19 Obstetrics Task Force, Lombardy, Italy: Executive management summary and short report of outcome. Int J Gynaecol Obstet. 2020 Jun; 149(3): 377–378. https://doi.org/10.1002/ijgo.13162. PMID: 32267531.
11. Ferrazzi E., Beretta P., Bianchi S., et al. SARS-CoV-2 infection testing at delivery: a clinical and epidemiological priority. J Matern Fetal Neonatal Med. 2020 Jul 23; 55(1): 863–870. https://doi.org/10.1002/ijgo.13339. PMID: 32660281.
12. Maraschini A., Corsi E., Salvatore M.A., et al. Coronavirus and birth in Italy: results of a national population-based cohort study. Ann Ist Super Sanita. 2020 Jul-Sep; 56(3): 387–389. https://doi.org/10.4415/ANN_20_03_17. PMID: 32959805.
13. Di Martino D., Chiavarino F., Patané L., et al. Assessing risk factors for severe forms of COVID-19 in a pregnant population: A clinical series from Lombardy, Italy. Int J Gynaecol Obstet. 2021 Feb; 152(2): 275–277. https://doi.org/10.1002/ijgo.13435. Epub 2020 Nov 26. PMID: 33098568.
14. Ferrazzi E., Frigerio L., Savasi V., et al. Vaginal delivery in SARS-CoV-2-infected pregnant women in Northern Italy: a retrospective analysis. BJOG. 2020 Aug; 127(9): 1116–1121. https://doi.org/10.1111/1471-0528.16278. Epub 2020 May 28. PMID: 32339382.
15. Marzollo R., Aversa S., Prefumo F., et al. Possible Coronavirus Disease 2019 pandemic and pregnancy: vertical transmission is not excluded. Pediatr Infect Dis J. 2020 Sep; 3 9(9): e261–e262. https://doi.org/10.1097/INF.0000000000002816. PMID: 32740456.
16. Papaccio M., Castellani R., Zanardini C., et al. Pregnancy and COVID-19: Do not overlook malaria. Int J Gynaecol Obstet. 2021 Jun; 153(3): 550–551. https://doi.org/10.1002/ijgo.13670. Epub 2021 Mar 29. PMID: 33714342.
17. Zanardini C., Saccani B., Franceschetti L., et al. Retest positive for SARS-CoV-2 RNA in pregnant women recovered from COVID-19. Ultrasound Obstet Gynecol. 2020 Dec; 56(6): 948–949. https://doi.org/10.1002/uog.23144. PMID: 33034931.
18. Papageorghiou A.T., Dervelle P., Guinier R.B., et al. Preeclampsia and COVID-19: results from the INTERCOVID prospective longitudinal study. Am J Obstet Gynecol. 2021 Jun 26; 30002-9378(21)00561-5. https://doi.org/10.1016/j.ajog.2021.05.014. Epub ahead of print. PMID: 34187688.
19. Villar J., Ariff S., Gunier R.B., et al. Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection: The INTERCOVID Multinational Cohort Study. JAMA Pediatr. 2021 Aug 1; 175(8): 817–826. https://doi.org/10.1001/jamapediatrics.2021.1050. PMID: 33885740.

INFORMATION ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

Cristina Zanardini, MD, PhD, Consultant, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0002-5871-1994

Marta Papaccio, MD, Resident, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-5223-1829

Roberta Castellani, MD, Resident, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0002-0174-9756

Rossana Orabona, MD, Consultant, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0002-7368-0823

Nicola Fratelli, MD, Consultant, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0002-1224-1640

Anna Fichera, MD, Assistant Professor, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-7793-714X

Laura Franceschetti, MD, Consultant, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-7065-2432

Franco E. Odicino, MD, PhD, Professor, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-8870-4739

Enrico Sartori, MD, Professor, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0003-4076-303X

Federico Prefumo, MD, PhD, Associate Professor, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-7793-714X

Federico Ferrari, MD, PhD, Consultant, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0003-4076-303X

Franco E. Odicino, MD, PhD, Professor, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-7065-2432

Federico Prefumo, MD, PhD, Associate Professor, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-7793-714X

Federico Prefumo, MD, PhD, Consultant, Division of Obstetrics and Gynaecology, Department of Clinical and Experimental Sciences, University of Brescia. ORCID: https://orcid.org/0000-0001-7793-714X

Zanardini Kristina, MD, PhD, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0002-5871-1994

Папаччо Марта, MD, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0001-5223-1829

Кастеллани Роберта, MD, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0002-7368-0823

Фичера Анна, MD, ассистент, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0002-1224-1640

Франческетти Лаура, MD, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0001-7793-714X

Одичино Франко Э., MD, PhD, профессор, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0001-8870-4739

Сартори Энрико, MD, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0003-4076-303X

Префумо Федерико, MD, PhD, доцент, Отделение акушерства и гинекологии, кафедра клинических и экспериментальных наук, Университет Брешиа. ORCID: https://orcid.org/0000-0001-7793-714X

Автор, ответственный за переписку / Corresponding author