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

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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

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Организация работы акушерского отделения во время пандемии COVID-19: краткий обзор литературы

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Аннотация

Пандемия новой коронавирусной инфекции (COVID-19) создала беспрецедентные проблемы для оказания высококачественной 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; дородовой уход; SARS-CoV-2; COVID-19

Рубрики MeSH:

БЕРЕМЕННОСТИ ОСЛОЖНЕНИЯ ИНФЕКЦИОННЫЕ – ТЕРАПИЯ

COVID-19 – ОСЛОЖНЕНИЯ

COVID-19 – ТЕРАПИЯ

МЕДИЦИНСКОЙ ПОМОЩИ ОКАЗАНИЕ – ОРГАНИЗАЦИЯ И УПРАВЛЕНИЕ

АКУШЕРСТВО ПРАКТИЧЕСКОЕ – ОРГАНИЗАЦИЯ И УПРАВЛЕНИЕ

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List of abbreviations

SARS-CoV-2 – severe acute respiratory syndrome coronavirus 2

HIGHLIGHTS	КЛЮЧЕВЫЕ ПОЛОЖЕНИЯ
The SARS-CoV-2 has had major effects on the provision of healthcare services worldwide.	Инфекция SARS-CoV-2 оказала серьезное влияние на оказание медицинской помощи во всем мире.
Before accessing health services, pregnant women should be triaged to detect any symptoms or exposure suggesting risk of SARS-CoV-2 virus infection.	Перед обращением за медицинскими услугами беременные женщины должны пройти сортировку для выявления любых симптомов или факторов, указывающих на риск заражения вирусом SARS-CoV-2.
The antenatal visits and screening ultrasound examinations recommended in low-risk pregnancy must be performed with the timing and modalities suggested by local or international guidelines both in asymptomatic patients, and in patients with suspected/confirmed SARS-CoV-2 infection.	Посещения медицинских учреждений в дородовом периоде и скрининговые ультразвуковые исследования, рекомендуемые при беременности с низким уровнем риска, должны проводиться в сроки и в условиях, рекомендованных местными или международными рекомендациями, как у бессимптомных пациентов, так и у пациентов с подозреваемой или подтвержденной инфекцией SARS-CoV-2.
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.	В случае подтвержденной или подозреваемой инфекции SARS-CoV-2 о женщине и ее младенце должна позаботиться мультидисциплинарная бригада, в которую входят акушер, анестезиолог, фельдшер-акушер, неонатолог, детская медсестра и инфекционист.
The mode of delivery should not be affected by the presence of COVID-19 unless the woman's respiratory conditions require urgent delivery.	Наличие COVID-19 не должно влиять на способ родоразрешения, за исключением тяжелого поражения дыхательной системы, требующего срочного родоразрешения.
Specific training and planning should be dedicated to the management of obstetric emergencies in SARS-CoV-2 infected women.	Необходимо проводить специальное обучение и планирование по оказанию неотложной акушерской помощи у женщин, инфицированных SARS-CoV-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 least possible 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])

Таблица. Модификация сроков проведения рутинных ультразвуковых исследований у женщин с низким акушерским риском в зависимости от того, являются ли они бессимптомными по COVID-19 или имеют симптомы и/или факторы риска ТОСС (воспроизведено с разрешения [8])

Scan / Исследование	Asymptomatic / Бессимптомные	Symptomatic and/or screen-positive for TOCC / Наличие симптомов и/или положительные результаты скрининга на факторы риска ТОСС
11 + 0 to 13 + 6 weeks (also for dating) / с 11 + 0 до 13 + 6 недель (также для определения срока беременности)	<ul style="list-style-type: none"> • Combined test • Offer NIPT • Комбинированный тест • Предлагается НИПТ 	<ul style="list-style-type: none"> • Reschedule combined test in 2 weeks if still within gestational-age window^a (unless local protocols differ) • Offer NIPT/serum screening and detailed scan in 3–4 weeks after quarantine • Комбинированный тест переносится на 2 недели позже, если все еще в пределах окна гестационного возраста^a (если местные протоколы не отличаются) • Предлагается НИПТ / скрининг маркеров сыворотки и подробное сканирование через 3–4 недели после карантина
18 + 0 to 23 + 0 weeks / с 18 + 0 до 23 + 0 недель	<ul style="list-style-type: none"> • Anatomical scan • Анатомическое сканирование 	<ul style="list-style-type: none"> • Reschedule after quarantine in 2–3 weeks^b • Перенести исследование на срок после карантина через 2–3 недели^b
Fetal growth scan in third trimester / Сканирование развития плода в третьем триместре	<ul style="list-style-type: none"> • Do not perform, unless clinically indicated • Не проводится, если нет клинических показаний 	<ul style="list-style-type: none"> • Do not perform, unless clinically indicated • Не проводится, если нет клинических показаний

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 a person with confirmed COVID-19; clustering of influenza-like illness / pneumonia (≥ 2 affected person).

NIPT – non-invasive prenatal testing. ^a – 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.

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.

Примечание: ТОСС – 14 дней до появления симптомов: путешествие, род занятий с высоким риском (например, работник лаборатории, медицинский работник, работа с дикими животными), история незащищенного контакта с человеком с подтвержденным COVID-19; наличие среди ближайшего окружения гриппоподобного заболевания / пневмонии (≥ 2 заболевших).

НИПТ – неинвазивное пренатальное тестирование. ^a – исследование на сроке 11–13 нед. не рекомендуется, за исключением случая, когда гестационный возраст не позволяет проводить его через 2 недели. ^b – в странах с установленным законом пределом гестационного возраста для прерывания беременности этот срок и последствия его переноса должны быть четко объяснены пациенткам до переноса приема.

Если у пациентки предельный гестационный возраст для прерывания беременности соответственно закону, рассмотрите возможность проведения сканирования с использованием соответствующих средств индивидуальной защиты или отсрочки на 2–3 недели.

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,

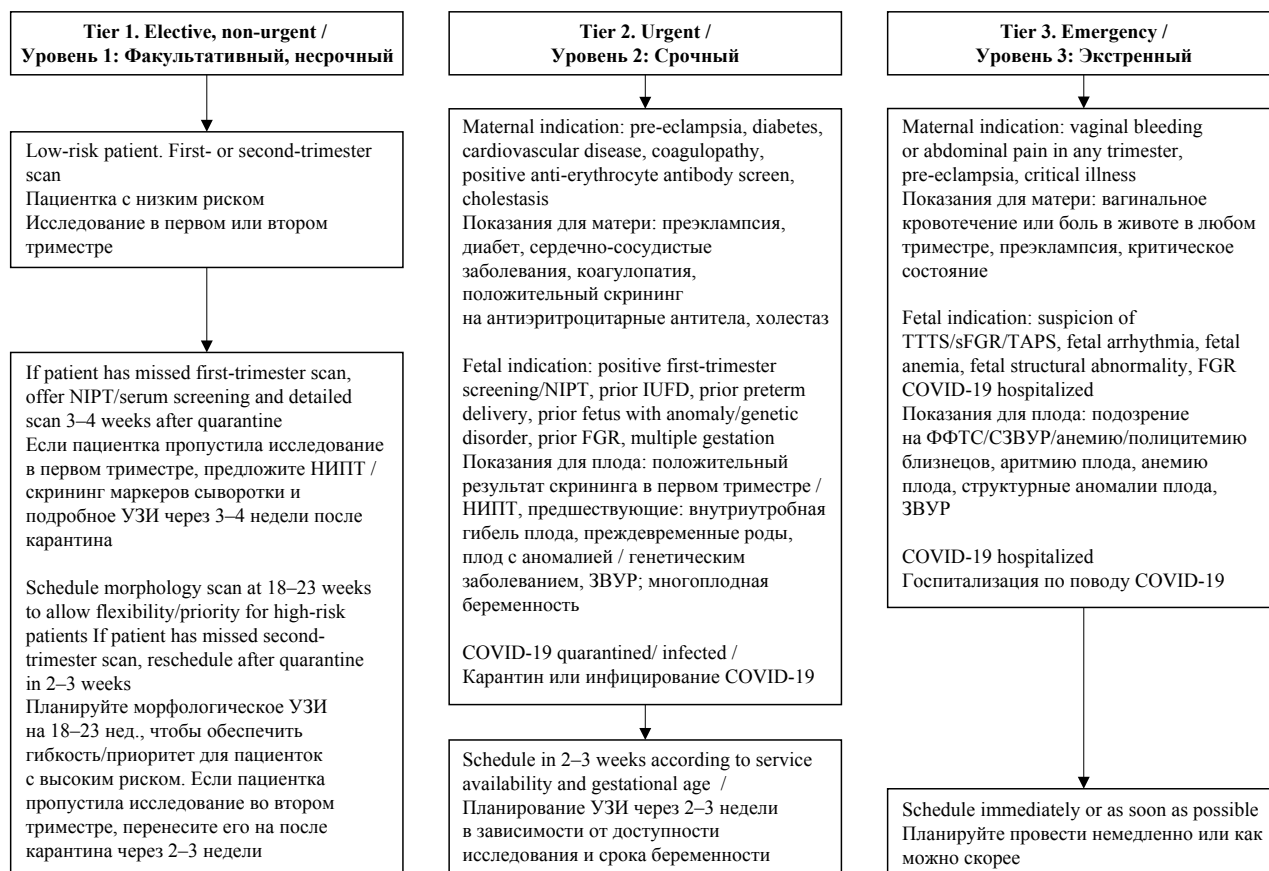


FIG. Algorithm for prioritizing appointments in obstetric ultrasound unit in context of COVID-19 pandemic (reproduced with permission from [8]).

Рис. Алгоритм приоритизации посещений акушерского отделения ультразвуковой диагностики в контексте пандемии COVID-19 (воспроизведено с разрешения [8]).

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

Примечание: ЗВУР – задержка внутриутробного развития; ВГП – внутриутробная гибель плода; НИПТ – неинвазивное пренатальное тестирование; СЗВУР – селективная задержка внутриутробного роста; САП – синдром анемии/полицитемии близнецов; ФФТС – фето-фетальный трансфузионный синдром.

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 infection¹. 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 section¹ [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 conditions¹ [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 control². 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

¹ <https://www.rcog.org.uk/globalassets/documents/guidelines/2021-02-19-coronavirus-covid-19-infection-in-pregnancy-v13.pdf>, Accessed Aug 11th, 2021.

² <https://www.thisinstitute.cam.ac.uk/research-articles/covid-19-managing-an-obstetric-emergency/>

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.

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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.

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