

COVID-19 pandemic in an Italian obstetric Department: sharing our experience

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Abstract. *Background and aim of the work:* The outbreak of the novel coronavirus (or SARS-CoV 2) has struck the healthcare system worldwide. Within few weeks hospitals had to reorganize their internal logistics and structure covering any level of care, from the Emergency Room to medical Departments. *Methods:* Due to the state of medical emergency, the Gynecology and Obstetrics Unit of the University Hospital in Udine developed new protocols for the usual standard of care, ensuring a safe environment for both healthcare providers and patients. *Results:* By a continuous update of scientific evidence, the Department was able to increase capacity as well as maintain flexibility when an unexpected high number of admissions was required. 40 COVID -19 positive patients were admitted to our Department between March and December 2020, none of them had complications and no case of cross infection between patients and medical staff were registered. *Conclusion:* We aimed to share our experience, which provided a notable lesson about what to expect and how to prepare a high-risk pregnancy referral center in response to a pandemic. (www.actabiomedica.it)

Key words: SARS-CoV 2, COVID-19, high-risk pregnancies, delivery, obstetric care, resources management

Introduction

The first case of a novel Coronavirus related disease (COVID-19) has been reported in mainland China, outside Hubei province last December (1). As of March 2020, more than 10.000 confirmed cases had been registered and the epidemic turned into a global pandemic according to the WHO. Among the western countries, Italy was hardly hit by the first pandemic wave earlier this year with the highest mortality rate in the northern regions. Although there is still no specific medical treatment for the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-Cov-2), the lockdown measure appears to be the only and effective strategy to prevent the infection spread. In agreement with that, following the release of travel restrictions

over the summer our nation saw another spike of infections by the end of September, which resulted in a current second pandemic wave.

The Italian Obstetric Surveillance System (ItOSS) provided data among the patients affected by SARS-CoV-2, including those patients infected during the pregnancy and postpartum. From February 25th to April 20th, a total of 146 obstetric women tested positive to COVID-19 in Italy, with an incidence in parturients of 2.1 per 1000 births. Obstetric patients are vulnerable to respiratory tract infections due to the physiological change of their pulmonary function and immune system. Cases of severe illness and adverse pregnancy outcomes associated with Severe Acute Respiratory Syndrome (SARS) and the Middle East respiratory syndrome (MERS) have

been previously described in literature including miscarriage, premature delivery, intrauterine growth restriction, and maternal death (2,3). Despite the effect of COVID-19 in pregnancy is still unclear, from the first available data it appears to be less serious than the other virus belonging to the Coronaviridae family (3-5). A recent study reports a maternal mortality and admission to Intensive Care Unit risk rates of 0.8% and 11.8% respectively (6). For newborns, aspects such low birth weight, early gestational age at time of infection and maternal ventilatory support are related to increased complication in the perinatal age. There is also no evidence of viral vertical transmission neither in pregnancy nor within delivery (7). However, evidence of psychological and psychiatric disorder in the post partum period for the mothers is raising (8).

The Department of Gynecology and Obstetrics of the University Hospital of Udine works as a referral center for high-risk pregnancies, providing its service to the Friuli - Venezia Giulia region. (Figure 1)

Every year the Department has 45.000 visits, 2.000 births, and performs 2.000 procedures of acute or elective surgery. Since the beginning of the pandemic the whole Unit, following national guidelines and internal protocols, has been transformed at different levels, including obstetrical triage, labor and delivery, recovery and inpatient postpartum settings. An entire dedicated COVID-19 wing has also been set up hosting up 6 rooms, each of them equipped with oxygen delivery devices.

We believe our experience can be translated into a lesson for the general medical community and particularly for the Obstetric Departments where infection prevention and control is crucial for both pregnant patients and newborns.

Triage for pregnant patients and newborns

Our Department is the main referral center for those patients with obstetric complications who need highly specialized care (9). The management of these patients is very specific and needs to be accurate (10, 11). Table 1 summarizes the most relevant papers on the subject.

Since the very beginning of the pandemic, a midwife-led triage strategy at the Department front door has been implemented. This process consists of an algorithm summarized on a flow-chart which is weekly updated according to the latest scientific evidence and national guidance (Supplemental material). Each patient is considered suspected COVID-19 positive until proven otherwise. When an elective admission (e.g., induction of labor) is planned, a nasopharyngeal molecular swab test is taken in advance and if positive the day of hospitalization the women will follow a red path consisting of a dedicated and isolated rooms for induction and for delivery. If case the procedure is not urgent, it may be postponed. For those patients requiring an ambulatory urgent treatment, a rapid swab test on the site is performed before entering the Department.

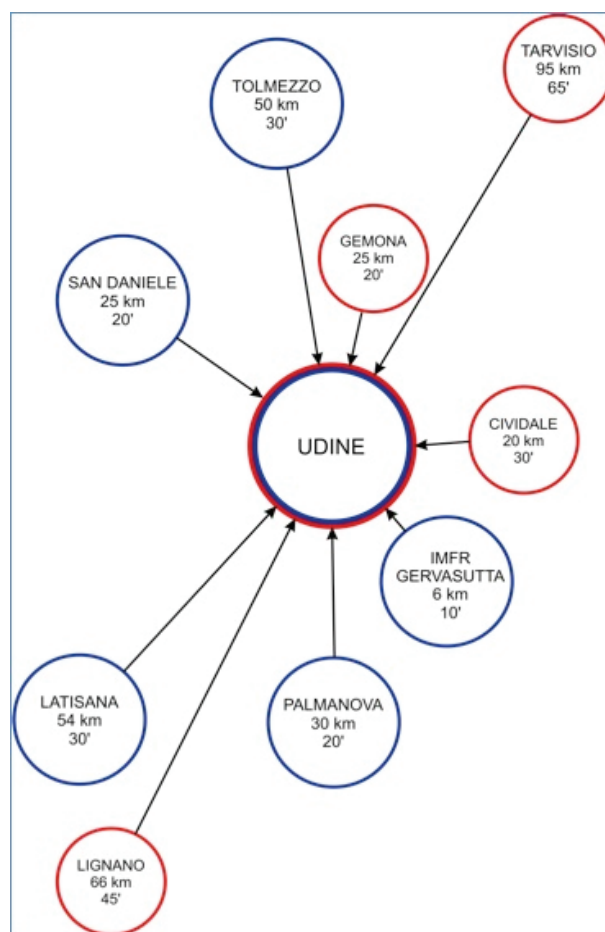


Figure 1. Hub and spoke system of the referral center of the University Hospital of Udine. Distances in kilometers (km) and minutes (') to destination with an ambulance are shown in the diagram.

Table 1. Most relevant articles on COVID-19 and pregnancy.

Authors	Title	Journal	Issue
Ferrazzi E.M. 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
Chen Y et al.	Maternal health care management during the outbreak of coronavirus disease 2019	J Med Virol	2020 Jul;92(7):731-739
López M et al.	Coronavirus Disease 2019 in Pregnancy: A Clinical Management Protocol and Considerations for Practice	Fetal Diagn Ther	2020;47(7):519-528
Fryer K. et al.	Implementation of Obstetric Telehealth During COVID-19 and Beyond	Matern Child Health J	2020 Sep;24(9):1104-1110
Stephens A.J. et al.	General Guidelines in the Management of an Obstetrical Patient on the Labor and Delivery Unit during the COVID-19 Pandemic	Am J Perinatol	2020 Jun;37(8):829-836
London V. et al.	Caring for Pregnant Patients with COVID-19: Practical Tips Getting from Policy to Practice	Am J Perinatol	2020 Jun;37(8):850-853
Aziz A. et al.	Telehealth for High-Risk Pregnancies in the Setting of the COVID-19 Pandemic	Am J Perinatol	2020 Jun;37(8):800-808
Alfieri N. et al.	COVID-19 does not stop obstetrics: what we need to change to go on safely birthing. The experience of a University Obstetrics and Gynecology Department in Milan	J Perinat Med	2020 Jul 7
Ashokka B. et al.	Care of the pregnant woman with coronavirus disease 2019 in labor and delivery: anesthesia, emergency cesarean delivery, differential diagnosis in the acutely ill parturient, care of the newborn, and protection of the healthcare personnel	Am J Obstet Gynecol	2020 Jul;223(1):66-74.e3
Kiely D.J. et al.	Health Care Team Training and Simulation-Based Education in Obstetrics During the COVID-19 Pandemic	J Obstet Gynaecol Can	2020 Aug;42(8):1017-1020
Jamieson D.J. et al.	Obstetricians on the Coronavirus Disease 2019 (COVID-19) Front Lines and the Confusing World of Personal Protective Equipment	Obstet Gynecol	2020 Jun;135(6):1257-1263
Wu B. et al.	Strategic plan for the management of COVID-19 in an obstetrics Department	Rev Assoc Med Bras	2020 Jul;66(7):890-893
Suzumori N. et al.	Management strategy of pregnant women during COVID-19 pandemic	Aust N Z J Obstet Gynaecol	2020 Aug;60(4):E9-E10
Qj H. et al.	Management of a delivery suite during the COVID-19 epidemic	Eur J Obstet Gynecol Reprod Biol	2020 Jul;250:250-252.
Trapani A.J. et al.	Childbirth, Puerperium and Abortion Care Protocol during the COVID-19 Pandemic	Rev Bras Ginecol Obstet	2020 Jun;42(6):349-355
Boelig R.C. et al.	Labor and delivery guidance for COVID-19	Am J Obstet Gynecol MFM	2020 May;2(2):100110
Franchi M. et al.	Management of obstetrics and gynecological patients with COVID-19.	Italian JOG	2020 March Vol. 32 (No. 1), 6-19
WAPM Working Group on COVID-19	Maternal and perinatal outcomes of pregnant women with SARS-CoV-2 infection.	Ultrasound Obstet Gynecol.	2021 Feb;57(2):232-241

Since the virus concentration or RNA is higher in the early presymptomatic phase, an antigen-detecting rapid diagnostic (ag-RDT) test is preferred as first level screening as it provides results in 12 minutes ensuring a safe COVID free zone. If hospitalization is required an ag-RDT test is followed by a molecular PCR test even when the first swab is negative. The result is validated within two hours.

Control swabs on the third and seventh day of the hospitalization are also performed. In case of anticipated patient discharge from hospital, the second one could be anticipated on the fifth day from the admission.

With a negative COVID-19 rapid swab test, the patient can follow the non-COVID-19 route, which is the standard pathway in use before the pandemic outbreak. Confirmed positive or high suspicious cases at triage are taken into isolation rooms (Figure 2) and examined by health care providers covered by personal protective equipment. An ultrasound machine and

the electronic fetal surveillance instruments are deep cleaned after their use.

In case of labor, delivery or other obstetric emergencies, a dedicated lift and entry to the delivery room (Figure 3) is guaranteed as well as donning and doffing area and theatre.

After birth, placental and fetal membranes collection for microbiological and histological analysis is recommended. If the newborn does not require intensive care, the mother can meet him even if she tested positive to the swab. However, if the mother has severe respiratory symptoms, the newborn will be isolated and admitted to the Neonatal Intensive Care Unit till the mother's negative swab. Fathers are allowed in the labor/delivery room following a negative swab; but visits are forbidden during the hospital stay.

Monitoring of the patient's respiratory symptoms by Lung Ultrasound

The use of Lung Ultrasound (LU) during the pandemic spread among several specialties including Obstetricians and Gynecologists. Although the technique seems to be feasible even by doctors with minimal ultrasound background, a proper amount of training, scanning approach and sonography basics are mandatory (12). The benefits of LU are many, including low cost, reproducibility, and prompt monitoring along with the

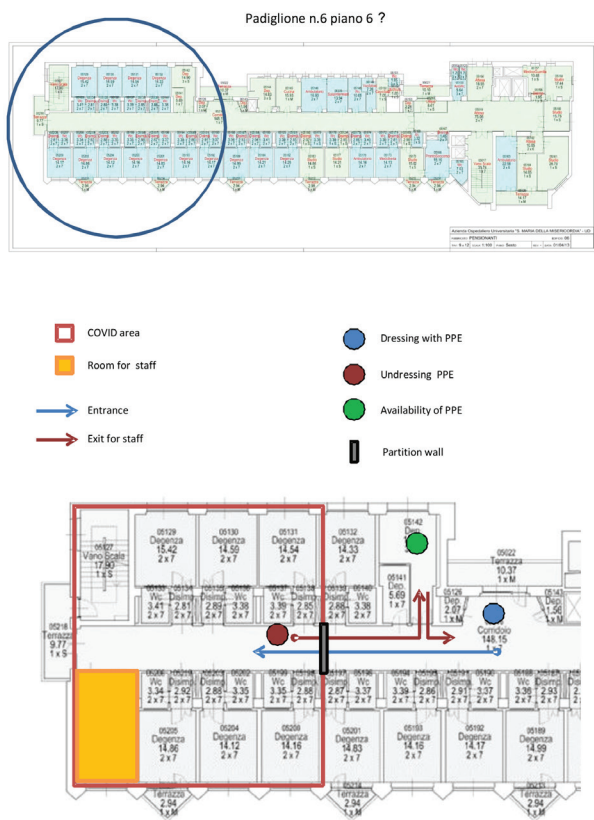


Figure 2. A depiction of the isolated COVID-19 wing of the ward.



Figure 3. A picture of the dedicated labor and delivery room for COVID-19 positive patients, with all the necessary equipment for mother and child.

patient's symptoms evolution (13-15). Moreover, since clinicians are performing bedside scans, no other hospital staff (porters, radiographers, and radiologists) has to be involved, saving time and containing the viral spread.

Overall, LU has proven its ability to diagnose pneumonia: accuracy ranges from 94% to 98% depending on the population settings (16-18). A standard LU protocol has been widely adopted by the medical community for COVID-19 patients consisting in the evaluation of 12 lung regions, 6 on each side. Each hemithorax has anterior, lateral, and posterior zones, (demarcated by the anterior and posterior axillary line) and further divided into superior and inferior fields by a horizontal line (19) (Figure 4).

Typical findings described in COVID-19 patients are as follow: coalescent B lines, subpleural consolidations, pleural irregularity, and thickening (20). The

“light beam” has also been reported as one of the main sonographic features (21), described as a shining band-form artifact spreading down from a large portion of a regular pleura often appearing and disappearing with an on-off effect in the context of a normal aerated lung pattern. Although not specific for COVID-19 infection, all these findings can raise the suspicion of infection even in absence of nasopharyngeal swab results (22). A remarkable aspect is that LU abnormalities can be detected prior to the presentation of the symptoms, guiding the decision-making process of the clinicians at front door triage (23).

A LU score (LUS) proposed by some Authors allows serial lung aeration assessments supporting the decision to escalate patient's medical care (24,25). Each of the 12 lung zones is scanned and scored from 1 to 3 according to the findings. Zero is assigned in presence of A-lines and pleural sliding, or ≤ 2 B-lines; 1 point is for more or equal to 3 well-spaced B-lines (interstitial syndrome); 2 points are calculated for coalescent B-lines or “glass-rockets”; finally, consolidation with “tissue like-sign” has a score of 3. The global LUS corresponds to the sum of each region's score and ranges from 0 (all regions are well aerated) to 36 (all regions are consolidated).

Gynecologists and obstetricians, who already have pelvic ultrasound skills, usually require minimal training to recognize the main sonographic patterns of COVID-19 pulmonary involvement (26,27). In our COVID-19 dedicated area, a LU is routinely used by clinicians in charge of the patient who underwent a short training session with expert sonographers. If the patient is clinically unstable and LU is suggestive for worsening, a CT-scan is indicated and the patient is admitted to a high dependency unit (28,29).

We started enrolling our patients in an obstetric multicenter national study. A total of 40 COVID - 19 positive patients were admitted to our Department between March 2020 and December 2020, of which 38 were obstetric and 2 were gynecology patients. The majority had no respiratory symptoms, while only 3 required oxygen therapy to maintain $SpO_2 > 95\%$. No complications were observed and there was no cross infection between other patients or staff. We performed serial lung ultrasound examinations to monitor the patients' conditions during the hospital stay.

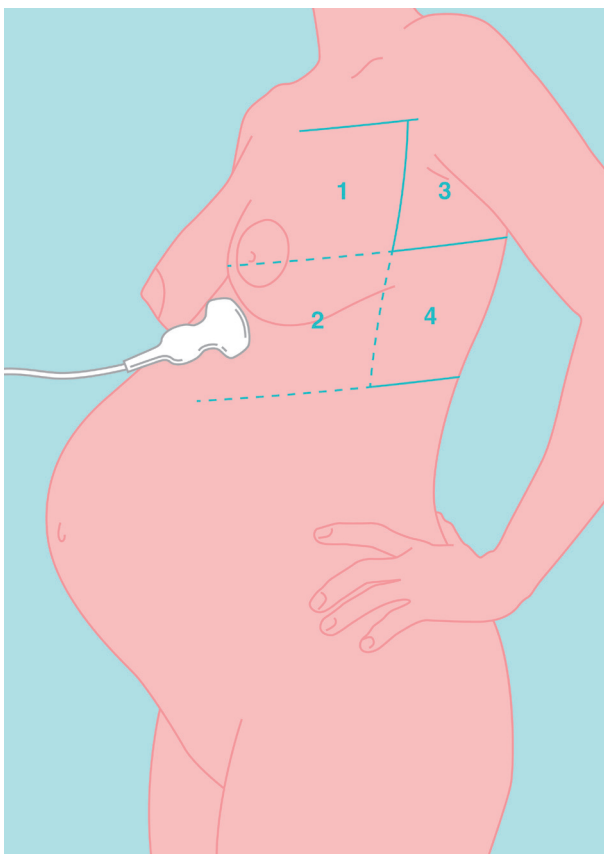


Figure 4. The anterosuperior (1) anteroinferior (2) laterosuperior (3), and lateroinferior (4) quadrants for the LU protocol. The abdominal mass and the breast increase could limit the exam, especially in zone 2.

Patient's discharge

The data regarding COVID-19 patient's admission and discharge are shared onto a national platform belonging to the Italian Healthcare Institute (30). Before discharge, the Unique Point of Access (UPA) organization that provides home support to patients, must be informed. UPA will inspect the patient's home and decide if the place is suitable for proper isolation avoiding contact with housemates. If adequate, an ambulance transport home is arranged.

The Physician Response Unit in collaboration with the regional healthcare facilities covers the majority of the out of hospital visits for COVID-19 patients and follows up those who have been recently discharged. By using handheld ultrasound devices, doctors can perform scans along with complete patient's assessment, evaluating their clinical progress or worsening that require hospitalization. If an admission from home or from another hospital is required a pre-alert call to our Obstetric Department is made in order to set the appropriate route and prevent healthcare workers and patients' cross-contamination.

Conclusion

Due to the rapid spread of SARS-CoV-2 virus, our Department has been daily involved in logistic and clinical organization issues. Our priority is to ensure continuous care of SARS-CoV-2 positive patients while maintaining a safe environment for healthcare providers and those affected by other obstetric conditions. In order to contain contamination, we highly recommend securing different routes for patients even when a reduction in COVID-19 cases is observed. Daily meetings are necessary to update the whole team of consultants and trainees working in the unit and they can be safely run by videoconference. Simulations of emergency scenarios are also essential to address successes and implement weaknesses of the system.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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