

Zero Maternal and Neonatal Deaths in Obstetrics at Cumilla Combined Military Hospital during COVID-19 (2021–2023)

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Abstract

The COVID-19 pandemic posed significant challenges to maternal and neonatal healthcare worldwide, with heightened risks of adverse outcomes due to resource constraints and infection concerns. Ensuring zero maternal and neonatal deaths required meticulous planning, adherence to protocols, and multidisciplinary teamwork. This study evaluated the strategies and outcomes contributing to achieving zero maternal and neonatal deaths in obstetrics at Cumilla Combined Military Hospital during COVID-19 (2021–2023). This prospective observational study was conducted at the Department of Gynecology and Obstetrics, Combined Military Hospital, Cumilla, Bangladesh, from January 2021 to December 2023. A total of 2,057 pregnant mothers who were admitted to the specified hospital and received obstetric services during the COVID-19 pandemic were purposively enrolled in this study. Maternal and obstetric data were meticulously recorded and analyzed using MS Office tools. Maternal outcomes showed 62.9% LUCS and 37.1% NVD, with complications like PROM (8.8%), PIH (14.9%), oligohydramnios (12.6%), preeclampsia (4.7%), and APH (5.4%). Delivery was delayed for negative confirmation in COVID-19 positive cases, except for emergencies. In this study, there were no maternal deaths. Fetal outcomes included a mean birth weight of 2.3 ± 0.6 kg, Apgar scores of 7.6 ± 1.2 (1 min) and 8.1 ± 1.4 (5 min), IUGR (12.7%), fetal distress (7.3%), and LBW (1.6%). There were no neonatal deaths either. Adhering strictly to COVID-19 management protocols during obstetric procedures in hospitals can lead to satisfactory pregnancy outcomes, even amidst the pandemic. Delaying delivery in COVID-19-positive pregnancies until the patient tests negative, with appropriate treatment, may help prevent potential adverse outcomes, even maternal and fetal death.

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Introduction

Maternal and neonatal mortality remains a significant global health challenge, with millions of deaths occurring each year due to preventable causes. According to the World Health Organization, approximately 295,000 maternal deaths and 2.4 million neonatal deaths were reported worldwide in 2020, with the majority occurring in low- and middle-income countries.^{1,2} However, remarkable advancements have been observed in some regions, attributed to improved healthcare systems, evidence-based interventions, and robust management protocols.³ In Bangladesh, maternal and neonatal mortality rates have declined steadily over the last two decades.⁴ The maternal mortality ratio (MMR) decreased from 574 per 100,000 live births in 1990 to 165 in 2020, while the neonatal mortality rate (NMR) dropped from 53 to 24 per 1,000 live births during the same period.⁵ Despite this progress, the COVID-19 pandemic presented new challenges, threatening the gains made in maternal and neonatal health.⁶ The

COVID-19 pandemic, declared by the World Health Organization in March 2020, disrupted healthcare delivery systems worldwide. In Bangladesh, the Ministry of Health and Family Welfare introduced COVID-19 management protocols to mitigate the impact of the pandemic on essential health services, including maternal and neonatal care.⁷ These protocols emphasized infection prevention measures, health worker protection, and patient care prioritization. Adherence to these guidelines has been instrumental in maintaining healthcare services during the pandemic.⁸ While COVID-19 does not directly

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increase maternal mortality compared to the general population, unsupervised pregnancies and the lack of routine antenatal visits during the pandemic may have indirectly impacted maternal health.⁹ The pandemic prompted a significant reallocation of healthcare resources and personnel to address the virus, leaving the effects of these changes on pregnancy care, particularly in rural settings, largely unexplored.¹⁰ Despite the global reports of increased maternal and neonatal mortality during the pandemic, the exceptional outcomes at Cumilla CMH highlight the importance of strategic planning, efficient resource allocation, and adherence to established health protocols. This study aimed to explore the factors contributing to the hospital's success, providing insights into how maternal and neonatal health outcomes can be safeguarded during public health crises. Key strategies implemented included segregating COVID-19 and non-COVID-19 patients, providing personal protective equipment (PPE), developing awareness, and proper pandemic management.

Methods

This prospective observational study was carried out at the Department of Gynecology and Obstetrics, Combined Military Hospital, Cumilla, Bangladesh, between January 2021 and December 2023. A total of 2,057 pregnant women admitted to the hospital and provided with obstetric care during the COVID-19 pandemic were included. Participants were chosen using a purposive sampling method. The study received approval from the ethical committee of the specified hospital. Written informed consent was obtained from all participants before data collection. The entire study adhered to the ethical principles of human research as outlined in the Declaration of Helsinki.¹¹ and was conducted following relevant

regulations, including the General Data Protection Regulation (GDPR).¹² During this whole intervention, the COVID-19 management protocol was followed toe-to-toe. All the awareness development brochures, leaflets, and other tools were supplied and made available to all the participants.



Figure 1: Awareness development brochure: No mask, no service



Figure 2: Awareness development brochure: Hand washing

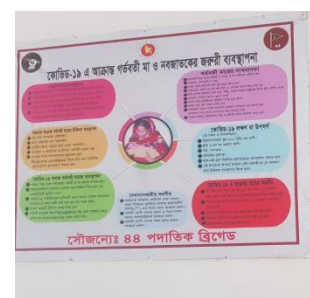


Figure 3: Awareness development brochure: COVID-19 management for pregnant mothers and neonates



Figure 4: Safety of health infrastructure

The study assessed various parameters, including total maternity admissions, referrals, antenatal outpatient department (OPD) visits, delivery statistics, and high-risk pregnancies. Despite the challenges of the pandemic, the hospital maintained regular obstetric services, adhering to the management protocols established by the Ministry of Health and the Directorate General of Health Services (DGHS) of Bangladesh. Emergency services operated 24/7, ensuring that all referred cases were managed

following COVID-19 protocols and regional guidelines mandated by the Government. For COVID-19-positive cases, delivery was delayed up to 42 weeks of gestation until the patient tested negative, following proper COVID-19 management procedures. In data analysis, the MS Office tools were used.

Results

In this study, upon analyzing the age and BMI of the participants, we observed that the mean $\pm$ SD age of the participants was 29.2 ± 3.7 years, and their mean BMI (Kg/m^2) was 26.4 ± 2.3 . While analyzing the gestational ages of the participants, the mean $\pm$ SD gestational age was 39.5 ± 1.9 . As per the gravidity status of the participants, among the total participants, more than three-fourths (75.5%) were multigravida, while the rest one-fourth (24.5%) were primigravida. Among our cases, Singleton pregnancy was 99.1% while 0.9% were multiple pregnancies. A history of lower abdominal cesarean section (LUCS) was found in 37.3% of the cases. In analyzing the comorbidities among the participants, we observed that diabetes mellitus was present in 6.3% of the cases, whereas in 2.8% of cases, chronic hypertension. Among 2,057 participants, 3% ($n=63$) were COVID-19-positive. In these cases, delivery was delayed for COVID-19-negative confirmation in 61.9% (40 weeks), 20.6% (41 weeks), and 11.1% (42 weeks), while 6.3% required emergency delivery. Maternal outcomes and complications in the study revealed that the mode of delivery was primarily Lower Uterine Cesarean Section (LUCS) in 62.9% of cases, while 37.1% of deliveries were Normal Vaginal Deliveries (NVD). Among the maternal complications, Premature Rupture of Membranes (PROM) occurred in 8.8% of cases, Preeclampsia in 4.7%, Oligohydramnios in 12.6%, Pregnancy-Induced Hypertension (PIH) in 14.9%, and Antepartum

Hemorrhage (APH) in 5.4%. Notably, there were no reported maternal deaths, reflecting a 0.0% mortality rate. Fetal outcomes and complications were as follows: The mean birth weight was 2.3 ± 0.6 kg, and the mean Apgar scores at 1 minute and 5 minutes were 7.6 ± 1.2 and 8.1 ± 1.4 , respectively. The gender distribution revealed that 52.2% of babies were male, while 47.8% were female. Fetal complications included Intrauterine Growth Retardation (IUGR) in 12.7% of cases, fetal distress in 7.3%, and Low Birth Weight (LBW) in 1.6%. Notably, no neonatal deaths were reported.

Table 1: Baseline data

Characteristics	Mean $\pm$ SD/n (%)	
	n	%
Age (Year)	29.2 $\pm$ 3.7	
BMI (Kg/m ²)	26.4 $\pm$ 2.3	
Gestational age (Week)	39.5 $\pm$ 1.9	
Gravidity distribution		
Primigravida	503	24.5%
Multigravida	1554	75.5%
Pregnancy types		
Singleton pregnancy	2039	99.1%
Multiple pregnancies	18	0.9%
History of previous LUCS	767	37.3%

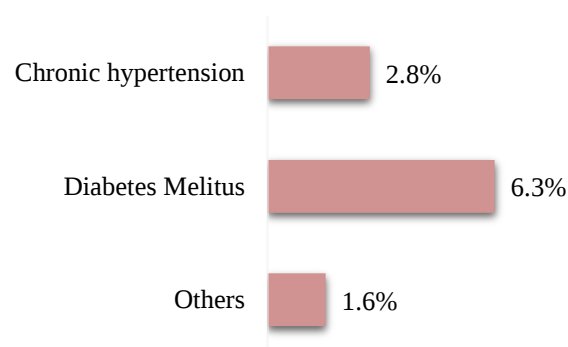


Figure 5: Comorbidity distribution without COVID-19

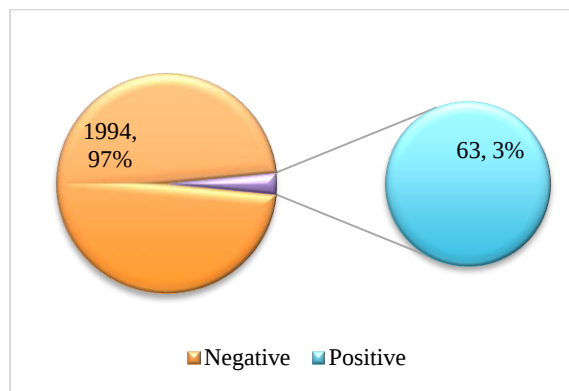


Figure 6: COVID-19 status distribution

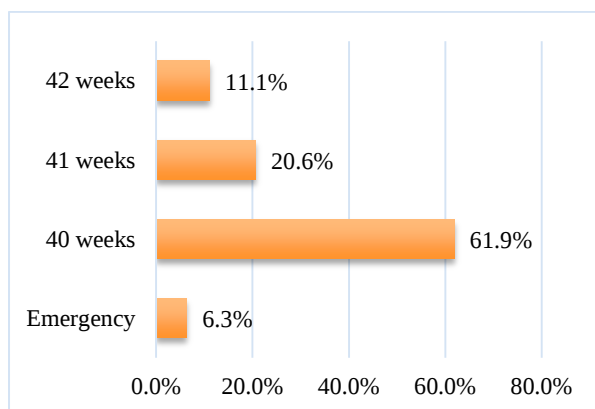


Figure 7: COVID-19-negative confirmation delay and emergency deliveries in positive cases (n=63)

Table 2: Maternal outcomes and complications

Outcomes	n	%
Mode of delivery		
NVD	763	37.1%
LUCS	1294	62.9%
Maternal complications		
PROM	182	8.8%
Preeclampsia	97	4.7%
Oligohydramnios	259	12.6%
PIH	307	14.9%
APH	111	5.4%
Maternal death	0	0.0%

NVD: Normal vaginal delivery, LUCS: Lower Uterine Cesarean Section, PROM: Premature rupture of membranes, PIH: Pregnancy-induced hypertension, APH: Antepartum hemorrhage

Table 3: Neonatal outcomes and complications

Characteristics	Mean $\pm$ SD/n (%)	
	n	%
Birth weight (Kg)	2.3 $\pm$ 0.6	
Apgar score (At 1 minute)	7.6 $\pm$ 1.2	
Apgar score (At 1 minute)	8.1 $\pm$ 1.4	
Baby's gender distribution		
Male	1074	52.2%
Female	983	47.8%
Maternal complications		
IUGR	262	12.7%
Fetal distress	151	7.3%
LBW	33	1.6%
Maternal death	0	0.0%

Discussion

The mean $\pm$ SD age of our participants was 29.2 $\pm$ 3.7 years, while their mean BMI (kg/m²) was 26.4 $\pm$ 2.3. A higher age range among pregnant mothers was reported in another study¹³, possibly due to differences in geographic location. Conversely, a similar BMI range was observed in a recent study.¹⁴ In this study, the mean $\pm$ SD gestational age of the participants was 39.5 $\pm$ 1.9 weeks. A comparative study by Resende *et al.*¹⁵ reported gestational age as a ratio rather than a mean, but their findings are comparable to ours. Many studies did not mention the gestational age of participants. Regarding gravidity, over three-fourths of the participants were multigravida, while the remaining one-fourth were primigravida. Some previous studies^{13,14} reported parity instead of gravidity, but their findings align closely with ours. Among our cases, 99.1% were singleton pregnancies, while 0.9% were multiple pregnancies. Similar singleton pregnancy ratios were noted in other studies.^{16,17} In our study, 37.3% of participants had a history of lower uterine cesarean section (LUCS), a higher proportion compared to

other regions of Bangladesh, although an even greater prevalence was reported in another study.¹⁸ Regarding comorbidities, diabetes mellitus was observed in 6.3% of cases, while chronic hypertension was present in 2.8%. Notably, diabetes mellitus and hypertension were identified as prominent comorbidities in participants of several other studies.^{14,19} In this study, of 2,057 participants, 63 (3%) tested positive for COVID-19. Among these positive cases, delivery was postponed while awaiting negative test results in most instances (61.9% at 40 weeks, 20.6% at 41 weeks, and 11.1% at 42 weeks of gestation), with only 6.3% requiring emergency delivery. Maternal outcomes and complications in the study showed that 62.9% of deliveries were performed via Lower Uterine Cesarean Section (LUCS), while Normal Vaginal Deliveries (NVD) accounted for 37.1%. Maternal complications included Premature Rupture of Membranes (PROM) in 8.8% of cases, Preeclampsia in 4.7%, Oligohydramnios in 12.6%, Pregnancy-Induced Hypertension (PIH) in 14.9%, and Antepartum Hemorrhage (APH) in 5.4%. Importantly, the study reported no maternal deaths, reflecting a 0.0% mortality rate. Comparable findings were noted in previous studies^{14,15}, except for maternal deaths, as this study observed none. Fetal outcomes and complications in the study indicated a mean birth weight of 2.3 ± 0.6 kg and mean Apgar scores of 7.6 ± 1.2 at 1 minute and 8.1 ± 1.4 at 5 minutes. Regarding gender distribution, 52.2% of the newborns were male, while 47.8% were female. Fetal complications included Intrauterine Growth Retardation (IUGR) in 12.7% of cases, fetal distress in 7.3%, and Low Birth Weight (LBW) in 1.6%. Notably, no neonatal deaths were recorded, resulting in a 0.0% neonatal mortality rate. Similar findings were observed in previous studies^{15,16}, except for

neonatal deaths, which were absent in this study.

Limitations of the study

This study was single-centered with a limited sample size and conducted over a relatively short duration. As a result, the findings may not accurately represent the broader national scenario.

Conclusion

Strict adherence to COVID-19 management protocols during obstetric procedures is crucial for achieving satisfactory pregnancy outcomes during the pandemic. Timely and appropriate treatment, combined with delaying delivery until the patient tests negative, can significantly reduce the risk of adverse outcomes, including maternal and fetal mortality. These measures highlight the importance of tailored obstetric care in managing COVID-19-positive pregnancies, ensuring both maternal and fetal well-being. Continued vigilance and adherence to evidence-based protocols are recommended to optimize outcomes during such challenging times.

Recommendations

To control maternal and neonatal deaths in obstetrics during COVID-19, strict quarantine protocols for infected pregnant women are crucial. Delaying non-urgent obstetric procedures until achieving a COVID-negative status prioritizes mother and neonate safety, minimizing virus transmission risks while ensuring essential health needs are addressed effectively.

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