

Referral Audit of Critically Ill Obstetric Patients: A Five-year Review from a Tertiary Care Health Facility in India

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ABSTRACT

Background: In resource-limited facilities, the greatest number of unfavorable maternal–fetal outcomes at referral hospitals is chronicled from emergency obstetric referrals of critically ill patients from lower health facilities. An efficient obstetric referral system is thus necessitated for improving maternal health. Referral practices have not been optimized effectively till date, owing to paucity of a detailed profile of referred women and indigenous barriers encountered during implementation process.

Materials and methods: This five-year retrospective audit was conducted in the Department of Obstetrics and Gynecology, VMMC and Safdarjung Hospital, New Delhi from September 2018 to 2023, in which records of all critically ill obstetric women referred were reviewed. The primary outcomes included were proportion and pattern of patients being referred, while secondary outcomes included demographic variables, referring hospital, reason and number of steps in referral, duration of hospital stay and fetomaternal outcome. The data were recorded on a predesigned case proforma and analyzed using the SPSSv23 version of software, after application of appropriate statistical tests.

Results: The referral rate to obstetric intensive care unit (ICU) ranged from 39 to 47% in last 5 years; hypertensive disorder of pregnancy (31%) being the foremost cause of the referrals. Around 2/3rd women were transferred without escort (70%) or prior communication (90.6%) and referral slips were incomplete in half the admissions.

Conclusion: Ensuring emergency obstetric care (EmOC) at various levels by up-gradation of health infrastructure would go a long way in improving fetomaternal health outcomes. There is need of standardized referral slips tailor-made to each state and contextualized protocols for early recognition of complications and effective communication between referral centers.

Keywords: Critically ill obstetric women, Fetomaternal outcomes, Obstetric ICU referral audit.

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HIGHLIGHTS

- This is one of the first retrospective referral audit of critically ill obstetric women admitted to obstetric intensive care unit (ICU) in India, especially in Delhi.
- Long duration of study, spanning over the period of five years allowed for a better understanding of the pattern of obstetric referrals for patients in need of emergency care.

INTRODUCTION

Emergency obstetric care (EmOC) involves the provision of care to a woman experiencing a complication of pregnancy or childbirth, with the goal of reducing maternal and neonatal morbidity and mortality. It involves diagnosing the problem, stabilizing her, and arranging for transport to the nearest facility capable of managing and treating the complication. Referral system is a crucial component of EmOC.¹

Referral is a process in which a healthcare worker at one level of the health system, having insufficient resources to manage a clinical condition, seeks the assistance of another facility with more resources.² A well-designed referral system helps in early identification of high-risk pregnancies and facilitates their management by connecting them with appropriate levels of care. Thus, a standardized maternal referral system should be in place to ensure accurate risk assessment in pregnancy in order to prevent maternal and neonatal morbidity/mortality and treat the high-risk cases under specialist care, especially for women residing in remote areas with no or limited access to health facilities. Because of the

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unpredictability of gestational complications and the possibility of their deterioration which endangers women's life, a uniform referral system is imperative for delivering comprehensive and evidence-based care tailored to patient's clinical condition, while promoting positive health outcomes and ensuring a high level of patient satisfaction.^{3,4}

A balanced and effectual referral system demands a well-organized transfer protocol, appropriate inter-referral support facilities including good inter-facility communication, community awareness, and pertinent feedback system. All these would help in reducing the impediments of time and distance during obstetric referrals; besides expediting the emergency care processes and furthering preparedness of referral centers for appropriate care

of such patients.^{5,6} Efforts to improve accessibility to hospitals through better transportation and timely management can be critical in enhancing maternal and neonatal survival. This, will lead to improved delivery of services at the tertiary level, simultaneously reducing their caseloads.

Thus, identifying the gaps and bolstering of referral system can play a crucial role in averting maternal morbidity and mortality. However, very few researchers have attempted to analyze the functioning of the Indian referral system till date. Keeping this in mind, the present study was conceived with an aim to evaluate the proportion and pattern of referrals to our critical care obstetric unit. Understanding these processes of critically ill obstetric referrals would in turn emphasize the crucial determinants of inter-facility transfers that would assist in augmentation of both the quality of referrals, and essential care provision at primary and secondary care centers. This would gradually cause a significant reduction in the workload at tertiary care hospitals.

MATERIALS AND METHODS

We conducted a retrospective, descriptive study and data of 5 years from September 2018 to September 2023 was collected, wherein all critically ill obstetric patients (antenatal/postnatal/postabortal) of age 18–40 years who had been referred for care to the critical care obstetric unit of the institute, were included. Direct walk-in and gynecology patients were excluded from the study. Ethical approval for the study was obtained from the Institute Ethics Committee (No. IEC/VMMC/SJH/Project/2023-07/CC-369).

The data collected from obstetric ICU refer-in register and e-records was recorded on a predesigned case proforma and entered in Excel spreadsheet and deciphered at the end of the study using the SPSSv23 version of software.

The primary outcomes were proportion and pattern of critically ill obstetric patients being referred. Secondary outcomes were demographic variables, referring hospital, number of steps in referral, reason for referral, pre-referral treatment, referral process (letter, communication, transport, accompanying personnel), level of delays which includes level I delay (deciding to seek appropriate medical care), level II delay (reaching an appropriate obstetric facility) and level III delay (receiving adequate care on reaching the facility). Hospital course and stay, major complications (hemorrhagic shock, eclampsia, sepsis and multiorgan dysfunction requiring mechanical ventilation, inotropic support, dialysis and massive blood transfusion), and maternal and/or fetal outcome.

Descriptive statistics was used to analyze mothers' profiles, indications for referral, referral communications, and maternal and fetal outcomes. The results were expressed as proportions and percentages.

RESULTS

There were a total of 6,851 obstetric ICU admissions during the study period, out of which 3,220 (47% referral rate) were referral cases during this time period. An increasing trend of referral rate was observed over the years from 39% in 2018–2019 to 47% in 2022–2023 (Fig. 1).

Among the study population, 3,020 (93.8%) women were below 35 years of age. About 2,200 (68.3%) of them were referred in antenatal period. In present study, those women who had three or more antenatal visits were considered as booked cases while those with only one antenatal visit were considered as registered

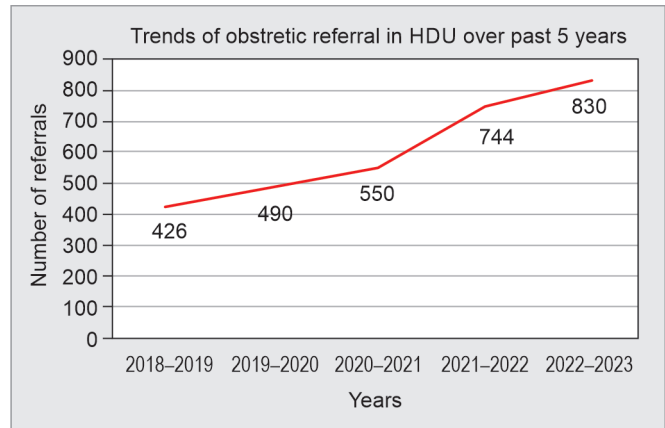


Fig. 1: Obstetric ICU/HDU admission rate during the study period

Table 1: Sociodemographic and maternal characteristic of referred patients

Serial number	Variable	Frequency (N)	Percentage (%)
Age			
1	18–25	520	16.2
2	26–35	2,500	77.6
3	>35	200	6.2
Obstetric details			
1	Antenatal	2,200	68.4
2	Postnatal	800	24.8
3	Postabortal	220	6.8
Antenatal care			
1	Booked	900	27.9
2	Unbooked	520	16.2
3	Registered	1,800	55.9

cases. Though half of the women (55.9%) were registered, yet only 900 (27.9%) were booked in any healthcare facility (Table 1).

Around 2,440 (75%) of women were referred from primary and secondary level healthcare facilities. Nearly, half (52.7%) of the women came directly from the referral center, while rest visited 2 or more hospitals prior to reaching the study institute, accounting for delay in the management. Around 1,900 (59%) women had level I delay and rest had level II or III delay. Only one-fourth (820) women were accompanied by medical personnel (doctor or nurse). Maximum women (90.6%) were referred without any prior communication with a referral slip, most of which were lacking proper diagnosis and documentation (~40%). Only 1,200 (37.2%) women were provided with transport facility by revering institute. A significant number of women (2,440) were referred from government run hospitals (75.77%). Approximately 80% were referred after first aid, initial resuscitation or surgical management. Only 664 (20.6%) were referred without any preliminary treatment (Table 2).

The most common clinical condition leading to referral was hypertensive disorders of pregnancy (31%) followed by hemorrhage (12.4%). Common non-obstetric indications for referral were non-availability of blood bank (14.9%), ICU facility (19.4%) or operation theater (9%). Majority (60%) of women had major complications with 43% requiring surgical intervention and 13.7% requiring mechanical ventilation; with 41.3% necessitating administration

Table 2: Referral details

Serial number	Variable	Frequency (n)	Percentage (%)
From type of institution being referred			
1	Government	2,440	75.77
2	Private	580	18.1
3	Nursing home	200	6.2
Type of referral			
1	Referred to higher center	2,340	72.7
2	On request	280	8.7
3	LAMA	480	14.9
4	Abscond	120	3.7
Treatment received			
1	None	602	18.7
2	First aid	638	19.8
3	Resuscitation	1,670	51.9
4	Surgical	248	7.7
Steps in referral			
1	From 1 hospital	1,700	52.8
2	From 2 hospital	1,200	37.3
3	From >2 hospital	320	9.9
Delay in referral			
1	Delay 1 (delay in decision making)	1,900	59
2	Delay 2 (delay in accessing services)	1,220	37.9
3	Delay 3 (delay in receiving appropriate care)	100	3.1
Communication before/while referral			
1	None	2,900	90.6
2	Communication on phone	320	9.4
Completeness of referral slip			
<i>Facility variables</i>			
1	Name and address of referring facility	3,100	96.2
2	Patient registration number	1,000	31.1
3	Time referred	2,240	69.6
4	Time patient left facility	420	13.0
<i>Patient identification</i>			
1	Name	2,900	90.1
2	Age	2,500	77.6
3	Phone number	340	10.6
<i>Clinical variables</i>			
1	Patient complaints	1,800	55.9
2	Clinical examination findings	340	10.6
3	Diagnosis	1,980	61.5
4	Laboratory findings	650	20.2
5	Medical treatment given	1,580	49.1
6	Reason for referral	1,650	51.2
7	Name and phone number of referring officer	444	13.8

(Contd...)

Table 2: (Contd...)

Serial number	Variable	Frequency (n)	Percentage (%)
Transport used for referral			
1	Private (by patient)	2,020	62.7
2	Ambulance (given by hospital)	1,200	37.3
Referral escorted by			
1	None	2,200	68.3
2	Doctor	300	9.3
3	Nurse	520	16.1
4	Other staff	200	6.2
Indication of referral			
1	Hemorrhage	400	12.4
2	Infection	320	9.9
3	Hypertensive disorder	1,000	31.1
4	Labor-related disorder	200	6.2
5	Medical disorder	320	9.9
6	Incidental/accidental disorder	180	5.6
7	Need of surgical intervention with	1,400	43.5
	a) Non-availability of blood bank	481	14.9
	b) Non-availability of ICU	626	19.4
	c) Non-availability of operation theater	293	9.1

of higher antibiotics like piperacillin tazobactam, vancomycin, linezolid, meropenem, clindamycin, tigecycline and teicoplanin. Almost 68.6% (2,210) women were discharged alive after receiving completion of treatment, while 10.4% (332) had mortality. Approximately, 45% of antenatal women had delivery by cesarean section with 75% babies live born, but 65.5% of neonates needed NICU admission (Tables 3 and 4).

DISCUSSION

An effective referral system enables the integration of primary, secondary, and tertiary levels of health care, resulting in optimal allocation of the resources. The current audit done for the same, identifies lacunae in the health system at different levels of care, strengthening of which can actually decrease an unwarranted burden on tertiary care hospitals; as been demonstrated by previous researchers. Table 4 shows comparative evaluation of past researches done on referral of critically ill obstetric women.⁵⁻¹²

The observations of the present study indicate that over the past 5 years, there has been a steady rise in the women admitted in obstetric intensive care unit (ICU) of our institute, who were referred from other institutes, reaching a rate of 47% of total obstetric cases in the last year; despite consistent advancements in the health sector by the government. This is in congruence with the increasing number of high-risk pregnancies owing to advance maternal age, rising cesarean rates, assisted reproductive technologies (ART), medical complications and global changes in demographics.⁷⁻⁹ Substantiating the same, an increased number of women in the study belonged to 26–35 years of age with mean age of the referred women being 29.8 ± 4 years. This is in accordance with

Table 3: Fetomaternal outcomes among patients

Serial number	Mode of delivery (for antenatal patients)	N (1,920)	Percentage (59.6%)
1	Vaginal delivery	520	27
2	Instrumental delivery	80	15.4
	A Forceps	50	62.5
	B Ventuse	30	37.5
3	Cesarean section	1,000	52.1
4	Exploratory laparotomy and proceed	350	18.3
5	Cesarean hysterectomy	50	2.6
<i>Neonate condition</i>		<i>N (1,920)</i>	<i>Percentage (%)</i>
1	Stillborn	498	25.9
2	Livebirth	1,422	74.1
<i>Apgar score</i>		<i>N (1,422)</i>	<i>Percentage (%)</i>
	1–3	332	23.3
	4–6	400	28.2
	7–10	690	48.5
1	NICU care	932	65.5
Maternal interventions in HDU			
1	Dialysis	302	9.4
2	Mechanical ventilation (intubation)	444	13.8
3	Inotropic support	543	16.9
4	Massive blood transfusion	644	20
5	Higher antibiotics	1,330	41.3
<i>Surgical intervention</i>		<i>N (1,720)</i>	<i>Percentage (53.4%)</i>
1	Cesarean section	1,000	58.1
2	Exploratory laparotomy	350	20.3
3	Cesarean hysterectomy	50	2.9
4	Postpartum hysterectomy	100	5.8
5	Interval laparotomy and proceed	220	12.8
6	Shifted to ICU	397/3,220	12.3
<i>Maternal outcome</i>		<i>N (3,220)</i>	<i>Percentage (%)</i>
1	Mortality	3,32	10.4
2	Recovered and discharged	2,210	68.6
3	LAMA	678	21

the previous reports which leads to the unwarranted congestion in tertiary institution; overburdening the system.^{5,11} This calls for capacity building in existing obstetrics HDU and ICUs across the region by increasing number of beds and workforce, apart from periodic training of staff.

An increasing number of critically ill women being un-booked (Fig. 2) is in line with previous investigators, where only less than a third patients were booked for routine antenatal care (25.3%).⁵ This could be due to the low socioeconomic status and missed opportunities for education and counseling during the antenatal period, rendering them more prone to the pregnancy complications.^{6,13} To prevent this un-booked status of antenatal patients, a multifaceted approach is required, including public health initiatives, community outreach programs and awareness campaigns for promotion of maternal and fetal health.

A greater part of seriously ill obstetric referrals came from the peripheral hospitals in quest of multidisciplinary care and surgical

intervention, implying the shortage of trained staff and deficient infrastructure at the lower level centers. Furthermore, most of the referrals had to travel to more than two hospitals in search of prompt/appropriate management depicting the dearth of obstetric specialists in first referral units (FRUs) and communication gap among the clinicians. Also, a considerable proportion of severely ill patients had high-risk pregnancies requiring accompanying healthcare staff and ambulance services, but just a handful actually received them. This could be attributed to the non-availability of trained professionals at these places, especially outside regular working hours. In present study, 47.2% (1,520) of women had been referred from 2 or more hospitals. This was comparable to the results of a past study (43.9%).⁶ This calls for restructuring the peripheral centers and ensuring infrastructure upgradation, job recruitment, training and skill development, integration of technology for electronic health records while providing financial support and sustainable funding mechanisms to maintain services.¹³

The absence of appropriate transport/an escort for a large number of women was in contrast to an earlier study, where higher number of patients were accompanied by medical professionals (64.9%).¹¹ This may be imputed to the scarcity of ambulance services at several health facilities, leading to the longer response times, or reduced accessibility owing to geographical challenges, financial constraints, and perceived faster alternatives. Thus, strategic procurement and deployment of ambulances well-equipped with advanced cardiovascular life support (ACLS) is quintessential to achieve timely referrals for such morbidly ill women in order to reduce level II delays.

Communication between the referring and receiving facilities is crucial for prompt management and allowing the receiving facility to prepare for an emergency. Past researchers have also shown that the lack of communication between settings is a major hindrance in the referral process.^{14,15} This audit also showed that more than 90% of patients were being referred without prior information, with just over one-third having appropriately filled referral form. However, this was substantially less than a similar South Indian audit, where a larger percentage of cases were informed to the receiving facility telephonically (47%) and only 37% referral forms were complete.¹⁶ A completely filled referral slip leads to a provision of improved quality of care.¹³ Incomplete documentation can result in repeated and unnecessary tests, in addition to medical errors. It not only disrupts the seamless patient transfer but also impedes follow-up care. Thus, conveying patient information during referral is vital, as it allows the establishment to timely initiate needed healthcare interventions.^{17,18} Thus, there is a need to critically appraise the existing healthcare delivery structure and learn from it, in order to foster comprehensive obstetric care delivered to the patients.

Therefore, administrators should establish mechanisms to monitor referrals periodically in order to decrease burden on tertiary hospitals with regular audits. Furthermore, the receiving facility should have a feedback form to inform the FRUs about course and outcome of their patients; this would complete the loop between the two facilities, and aid in bridging the gaps in the future. The need for telemedicine to facilitate real time communication and appointment of dedicated liaison personnel for coordinating referrals cannot be overlooked. Additionally, it will aid in recognizing gaps in patient management leading to delay in care from FRUs.

Akin to earlier investigations on obstetric ICU referrals, the most common reason for patient transfer was hypertensive disorders of

Table 4: Comparative evaluation of past audits of obstetric referral to ICU/HDU

S.No.	Author and year of study	Study type/duration	Audit/study population	Primary and secondary outcomes	Results
1	Advait, et al. (2023) ⁵	Prospective/ 18 months	Obstetric patients admitted to the MICU	The correlation of APACHE II and sequential organ failure assessment (SOFA) score with clinical outcome The effect of demographic factors and interventions overall obstetric outcome were evaluated	Hypertensive diseases of pregnancy (68%) were the most common reasons for ICU admission Patients who died (21.3%) had a significantly higher SOFA score (6.5 ± 0.8) 24% needed ventilator support 83.9% were referred for advanced maternal or neonatal care 37.3% of the referral forms < 50% completed
2	Ameyaw EK, et al. (2022) ¹²	Retrospective/ 1.7 years	All patients referred to antenatal, antenatal emergency, labor and neonatal intensive care of a referral hospital	To audit documentation or referral forms that accompany referred maternity cases	70% cesarean delivery, maternal mortality 4% 10% escorted with ambulance 52% of the patients were referred from secondary health-care centers 32% of the patients received some emergency care before referral 72.5% vaginal delivery 64.9% escorted by ambulance 35.5% were un-accompanied
3	Idris, et al. (2023) ¹⁰	Retrospective/ 1 year	General obstetric referrals	Appropriateness of referral, timeliness and quality of care given at receiving facility Fetomaternal outcome	Obstetric patients accounted for 3.8% for all ICU admission with overall mortality of 11.1% Mortality was highest (37.5%) in patients with preeclampsia A majority (54.2%) of the ICU admission were due to hemorrhagic/hematological causes Obstetric hemorrhage (27.7%) The most common intervention was artificial ventilation (63%) The mortality among obstetric admissions in the ICU was (33.8%) 56.20% of the cases were between of 20 and 25 years 80.91% were admitted in postpartum period 37.12% cesarean delivery
4	Ghardallou M, et al. (2019) ¹¹	Cross sectional descriptive study/ 2 months	General obstetric referrals	Pregnancy characteristics, management in the referring maternity, indications for referral maternal and fetal outcomes.	The referral rate was found to be 31.7% Preterm labor (30.6%) and pregnancy-induced hypertension (17%) were the main reasons for referral
5	Ismail, et al. (2019) ⁹	Retrospective/ 4 years	Obstetric admissions to the ICU	Outcome of obstetric patients admitted to the ICU	
6	Ramachandra Bhat PB, et al. (2013) ⁸	Retrospective/ 6.5 years	Obstetric admissions to the ICU	Obstetric status at the time of admission to ICU, the primary diagnosis, complications, the mode of delivery, interventions, maternal outcome, and duration of ICU stay	
7	Rathod AT, et al. (2016) ⁷	Retrospective/ 3 years	All obstetric cases admitted to the ICU	The risk factors responsible for ICU admission were analyzed	
8	Shashi Kant, et al. (2018) ⁶	Retrospective/ 1 year	All antenatal and postnatal women admitted in maternity ward referred to the higher center	Profile of women being referred, clinical conditions requiring referral and logistic reasons for referral were studied	

(Contd...)

Table 4: (Contd...)

S.No.	Author and year of study	Study type/duration	Audit/study population	Primary and secondary outcomes	Results
9	Present study	Retrospective/ 5 years	Women referred to obstetric ICU	The primary outcomes were proportion and pattern of critically ill obstetric patients being referred Secondary outcomes included demographic variables, referring hospital, number of steps in referral, reason and pattern of referral, duration of hospital stay and final maternal and/or fetal outcome	The referral rate to obstetric ICU ranged from 39 to 47% in last five years Hypertensive disorder of pregnancy (31%) being the most cause of the referrals. 37.2% provided with ambulance 70% referred without any accompanying medical personnel or prior communication (92.8%) and the referral slips were incomplete in >50% admissions Level I delay was found in Majority (59%) admissions 70% cesarean delivery

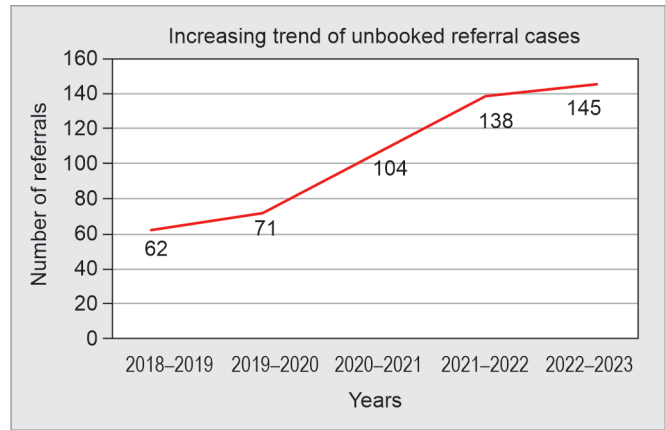


Fig. 2: Increasing number of unbooked women during study period

pregnancy.^{5,19} This underscores it as being one of the leading causes of maternal mortality in India, apart from postpartum hemorrhage (PPH) and sepsis. Also, it is implied that doctors in all settings should be adequately educated about the early warning signs of these life-threatening conditions in order to diagnose them in early stages and to prevent complications stemming from them.²⁰ This can be attained through regular training and workshops, use of standard screening protocols, steadfast responsiveness and readiness for management. Providing risk-appropriate care and emergency services throughout the day is a key strategy for safeguarding maternal health by ensuring pregnant females receive optimal care at institutions that are best prepared to meet their needs. This is in accordance with the mandate given by Ministry of Health and Family Welfare (MOHFW).²¹

Half of the referrals in the present study were due to nonmedical reasons owing to infrastructural shortcomings, such as non-availability of blood bank, obstetric critical care units, and NICU. This is in consonance with similar attempts in the past to investigate obstetric ICU referrals, which concluded that availability of adequate infrastructure could have empowered the peripheral hospitals to handle majority of cases by themselves.¹² It also creates apprehension in the community about competence and availability of human resources leading to underutilization of services at these places. Thus, the requisite for upgrading the institutes offering medical services, together with constant efforts to meet the laid standards should be reiterated, which can play a critical role in improving maternal and neonatal outcomes. The idea of streamlining the inter-hospital transfers has been supported by previous studies as well.^{10,12,19} We strongly advocate that policymakers should lay down clearly defined protocols regarding “whom”, “how” “when” and “where” to refer in case of obstetric emergency.

Most of the study population was delivered by cesarean section which was akin to the study of obstetric referral conducted in 2023,¹⁶ when compared with the direct walk-in/OPD admissions in the institute. The increased proportion of operative delivery was linked to the greater maternal risk and complications in these women.^{16,20} High prevalence of iatrogenic preterm births was necessitated to prevent maternal complications, leading to increased NICU admissions; same can be a reason for higher stillbirth rate.^{12,16} Despite providing high-quality ICU care and endowing a multidisciplinary approach to ensure timely interventions for referred cases, the unfortunate outcome was the occurrence of 332 maternal deaths, which was not recorded by previously mentioned

studies.^{11,12,16} A testament to the excellent standard of treatment offered to all the patients is the discharge of 68% women compared with the other past reports.¹¹


STRENGTHS AND LIMITATIONS

The strengths of this study were the large sample size and long period of data collection, it spanned over the period of 5 years. The study was conducted at obstetric ICU of the hospital, one of the largest in India catering to substantial number of high-risk obstetric patients, with around 3,000 deliveries per year. Thus, it demonstrates the general practices and issues encountered in critical care obstetrics across this region of the country. However, it does not reflect the obstetric referral practices across whole country. Thus, a larger data from different parts of country is needed to understand the pattern of these referrals.

CONCLUSION

The results of the present research reiterate the necessity of referral protocols and guidelines for all health facility levels, which should be updated on a regular basis with evolving capacity, together with establishment of formal referral linkages between hospitals. Additionally, it is critical to prioritize infrastructure upgrades towards improving care. It also underscore the need for effective communication between referral centers. An attempt to tackle these issues would greatly enhance the abilities of primary and secondary health centers thereby mellowing out the inadvertent pressure on tertiary care institutions, ensuing their smooth functioning.

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