

MATERNAL DEATH REVIEW TO KNOW THE DETERMINANTS OF MATERNAL MORTALITY IN A DISTRICT HOSPITAL OF CENTRAL INDIA

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ABSTRACT

Background: Avoiding maternal deaths is possible even in resource-limited countries, but correct information on which to base maternal health programmes is required. Knowing the level of maternal mortality is not enough to prevent further deaths; there is need to understand the underlying factors that led to the deaths. Maternal death review is one of the oldest and the most documented methods that can be effective in improving emergency obstetric care and maternal outcomes. **Objectives:** To study the maternal deaths in a District level tertiary health care unit so as to find the determinants of maternal mortality and suggest local solutions. **Methods:** Maternal deaths occurring in a tertiary care district hospital were analysed using maternal death review form. Socio demographic profile, antenatal care, labour and delivery parameters and cause of death was studied. Analysis was done using computer software stata. **Results:** In the present study there were 12 maternal deaths among 4953 deliveries giving a Maternal Mortality ratio of 242.27 per 1,00,000 live births. Pulmonary embolism was the leading cause of death complicating obstetric disorders of pregnancy induced hypertension and eclampsia. Most of the women died in the postpartum period. The affected population was rural, illiterate and belonged to the 19-29 years age group. **Conclusions:** Maternal death review is an important tool for delineating the causes of maternal deaths and finding cause specific and need based local solutions for curtailing maternal mortality.

Keywords: Maternal deaths; mortality; eclampsia; antepartum hemorrhage

1. INTRODUCTION

The fifth Millennium Development Goal (MDG 5) is improving maternal health with a target of reducing the maternal mortality ratio (MMR) by three-fourths between 1990 and 2015¹. The World Health Organisation (WHO) estimates that worldwide 5,36,000 women die each year from complications of pregnancy and childbirth² and 99 % of them take place in resource poor countries. Avoiding maternal deaths is possible even in resource-limited countries, but requires correct information on which to base programmes. Knowing the level of maternal mortality is not enough to prevent further deaths; there is need to understand the underlying factors that led to the deaths³. Each maternal death has a story to tell and can

provide us with practical ways of addressing the problem. In most countries with high maternal mortality, health facility records are usually deficient. The causes of some maternal deaths in obstetric registers are ill defined, which makes it difficult to compile the causes of maternal deaths. Yet information on the underlying causes of maternal deaths, drawn from clinical records and from social and health systems, provides the evidence for local decision-making on the interventions needed to reduce maternal morbidity and mortality.

A maternal death audit is an in-depth systematic review of maternal deaths to delineate their underlying health, social and other contributory factors, and the lessons learned from such an audit are used in making

recommendations to prevent similar future deaths. It is not a process for apportioning blame or shame but exists to identify and learn lessons from the remediable factors that might save the lives of more mothers in future. Although this audit process empowers local authorities to understand and take steps to improve maternal health, most of the countries with high maternal mortality have not fully instituted it. It is imperative to establish or strengthen maternal death audits in these settings, both to generate evidence for determining interventions and to provide the data needed to feed into the national civil registration system for the computing of MMR. Three approaches can be used—confidential enquiry into maternal deaths (CEMD), facility-based death reviews and community-based death reviews (also called verbal autopsy)⁴⁻⁷.

In resource poor settings, a facility based maternal deaths review (MDR), defined as a “qualitative, in depth investigation of the causes of and circumstances surrounding maternal deaths occurring at health facilities”⁸ is one of the oldest and the most documented methods that can be effective in improving emergency obstetric care and maternal outcomes⁹.

This study is a facility based maternal death review undertaken to understand the causes of maternal deaths in a district hospital of central India so that corrective measures to reduce preventable maternal deaths can be suggested in that health setup.

2. MATERIAL AND METHODS

The Department of Obstetrics and Gynaecology, Mahatma Gandhi Institute of Medical Sciences, Sevagram, Wardha, a tertiary care Medical Institute in Central India is the nodal centre for the Emergency Obstetric care project which trains non specialised medical doctors in management of emergencies in obstetrics. The team from the medical institute regularly visits the District Hospitals allotted under their care for inspection. A study of facility based maternal death review was undertaken in one of these District hospitals of Maharashtra to find out the determinants of maternal deaths in that health setup. This district hospital provides labour and delivery services to around 10,000 women per year. Maternal deaths occurring over a period of 6 months from January 2011 to June 2011 were analysed using a preformed

data collection tool called Maternal Death review form. Twelve maternal deaths were reported during this short period, the data was filled in the prescribed format by the Medical Officer attending the dying woman. Special emphasis was given on socio-demographic profile of the patient, parity, antenatal care, time interval from admission to death, obstetric complications, other labour and delivery characteristics and cause of death. The data was then analysed using computer software Stata and is presented as percentages and proportion.

3. RESULTS

The study included 12 maternal deaths over a 6 months period. Most of the women were between 19 and 29 years of age, the mean age being 25.8 ± 2.97 years. All the women belonged to the rural area. Majority of maternal deaths (70 %) belonged to lower socioeconomic status, followed by (30%) from the upper lower class. Majority (80 %) were illiterate and only (20 %) were educated up to primary and secondary level. The mean gravidity was 2.1 ± 0.87 , with 20 % of the women being primigravida, 60 % second gravida and 10 % each being third and fourth gravida. Forty % of women had no live issue and one live issue each and 10 % had 2 live children and 3 live children each. Sixty percent women were referred from another health care unit and 70 % had not received any antenatal care. Out of the 30 % women who received antenatal care majority was from a specialist. However none of the woman who received antenatal care had knowledge of risk factors pertaining to pregnancy status

The general condition of 50% of the patients was stable at admission 20% were serious and 30% were unconscious. Only 30% of the patients had received antenatal care at some point of time. Anaemia was present in 70% of patients and preeclampsia complicated 40% of them. There was one case of Eclampsia, antepartum hemorrhage and septic abortion each. None of the women had history of previous caesarean delivery. Fifty percent of women were not in labour and 40 % were in labour at the time of admission. But overall 80% of the women had experienced labour pain at some point of time before or after admission. However, 60% of the patients died in the postpartum period which was statistically significant (95% CI, 0.23 – 0.96). 60% of patients delivered vaginally without

any assistance while 40% died before they had delivered. There were no caesarean sections. The mean interval from onset of complications to admission was 2.1 ± 1.37 hours. Forty percent of women sought medical care within one hour of developing complication and 80 % within 12 hours, 10 % reported after 24 hours and 10 % took more than 48 hours to seek admission for management of complication. The mean admission to death interval was 2.3 ± 1.059 hours. One woman died within 15 minutes of reaching the health care facility, 20 % died within one hour and 50 % died within 24 hours of admission.

Thirty% had intrauterine foetal death, 10% had fresh still born baby, 20% had a live issue. 40% of them received blood transfusion and 10 % received physician assistance, however none received surgical intervention. If we look into the cause of death , 30 % women had pregnancy induced hypertension with pulmonary embolism, 30 % had suspected pulmonary embolism, one woman had septic abortion with septic shock and adult respiratory distress syndrome, one had Eclampsia with aspiration pneumonia and one had placenta praevia with hypotensive shock. Among the indirect causes 40 % had anaemia and 10% had organic heart disease.

4. DISCUSSION

India has a maternal mortality ratio of 212 per 1,00,000 live births, which is much above the objective of 100 per 1,00,000 live births as per fifth Millennium Development Goal (MDG-5)¹⁰. Preventing maternal deaths and reducing maternal morbidities has become the maternal health priority in the developing world as most of them are preventable and can be reduced simply with skilled care by the health professionals. The loss of a mother shatters a family and threatens the well-being of surviving children. Evidence shows that infants whose mother dies during childbirth are more likely to die before reaching their second birthday than infants whose mother survives¹¹.

In the present study there were 12 maternal deaths among 4953 deliveries giving a Maternal Mortality ratio of 242.27 per 1,00,000 live births which is much above the maternal mortality rate in Maharashtra state of 104 per 1,00,000 live births¹⁰ but also above the national average of 212¹⁰. The health care facility under study is a tertiary care referral centre of District level and pregnant women

with severe morbidity and pre-existing complications are referred here for management, which explains the higher MMR in the health care unit. Studies conducted in various tertiary care centres have reported a MMR of 200 to 880 per 1,00,000 live births¹²⁻¹⁵. The majority of women in India do not deliver in hospitals and therefore the incidence and proportion of complications seen is probably very different from what occurs in the community. At the same time hospital data estimated may be more than community mortality rate as high risk women are referred to hospital for delivery and often the women are only transported to hospital when they develop life threatening complications, creating a 'Hawthorn' bias.

In the present study most of the women were between 19 and 29 years of age, the mean age being 25.8 ± 2.97 years. Forty % of the deaths were in the 19 to 24 years age group, 30 % in 24 to 29 years and 30 % in the 30 to 34 years. This is comparable to the findings of other researchers who reported maximum deaths in the 20 to 30 years age group¹⁶⁻²¹. The Indian tradition of early marriage and early pregnancy may be responsible for this distribution.

All the women belonged to the rural background and majority of maternal deaths (70 %) occurred in lower socioeconomic status, followed by (30%) from the upper lower class. Poverty and illiteracy are the major determinants of poor health seeking behaviour and are major social risk factors for maternal mortality. Besides poor resources of health facilities in rural areas women may lack awareness regarding the seriousness of the issues. Delayed referral, poor transport facilities, underutilization of health facilities, and poor socioeconomic status are responsible for the high MMR²².

The mean gravidity of the deceased women was 2.1 ± 0.87 ; with 20 % of the women being primigravida and 80 % were multigravida. High death among multigravidas as compared to primigravida has also been found in other researches¹⁶⁻²¹. According to the maternal depletion hypothesis, " a close succession of pregnancies and periods of lactation worsens the mother's nutritional status because there is not adequate time for the mother to recover from the physiological stresses of the preceding pregnancy before she becomes subject to the stresses of the next pregnancy"²³. A 1945 study argues that either too short or

too long an interval can increase the maternity risk²⁴. Gregory Emiry observed that the parity risk pattern shows a V-shape: a high relative risk for first births, a low relative risk for second or third births, and a progressively higher relative risk for the higher parities. Greater proportions of teen-age and unmarried mothers contribute to the high risk for first births. In the higher parities, the contributing factors include ageing and greater risk of pregnancy complication from non-obstetric disease²⁵.

Sixty percent women were referred from another health care unit and 70 % had not received any antenatal care. Out of the 30 % women who received antenatal care majority was from a specialist. However none of the woman who received antenatal care had knowledge of risk factors pertaining to pregnancy status. MCH services are essential as regular ANC check-ups can help detect risk factors and take pertinent steps to alleviate them. Correction of anaemia is most essential. More than half of the pregnant women in India i.e. at least 13 million women suffer from anaemia during pregnancy. 1 in 5 of all maternal deaths is attributed to anaemia which contributes to 19% of maternal mortality as per statistics of Registrar General of India 1992²⁶. The apathy of pregnant women to receive free and easily accessible antenatal care needs to be looked into. To give maximum benefits to pregnant women especially in the developing nations, we have to provide antenatal care at the doorsteps of the community²⁷.

Most of the women sought care within one hour of developing complications; some however reached the health facility even after 48 hours of the morbid event. However, one woman died within 15 minutes of reaching the health care facility, 20 % died within one hour and 50 % died within 24 hours of admission. Probably lack of qualified medical attention at primary care centre and delayed referral resulted in late intervention. Most of the women were in poor general condition at the time of admission. It becomes apparent that many of the deaths that occurred could have been avoided if they were transferred earlier further highlighting the need for adequate and quick transport facilities¹³. It is seen that even facilities in the urban hospitals are grossly inadequate with the shortage of anaesthetists, pathologists and blood banks. This prevents early intervention and adequate emergency

obstetric care²⁶. Lack of skilled primary care at the time of obstetrical emergency and delayed referral are two important factors contributing to high maternal mortality rate thus, good antenatal care alone has little value in reducing maternal mortality unless linked to efficient EmOC²⁸.

If we look into the cause of death, 30 % women had Pregnancy induced hypertension with pulmonary embolism, 30 % had suspected pulmonary embolism, one woman had septic abortion with septic shock and Adult respiratory distress syndrome, one had eclampsia with aspiration pneumonia and one had placenta praevia with hypotensive shock. Among the indirect causes 40 % had anaemia and 10% had organic heart disease. Bera et al²⁹ revealed that among the direct causes, haemorrhage contributed in 23.8% and sepsis for 16.4% deaths and among the indirect causes, jaundice 9.9%, followed by anaemia and heart disease, with 5.9% and 3.4% deaths respectively. Sengupta et al²⁰ also noticed that among the direct causes, haemorrhage (12.40%) and sepsis (17.82%) are leading and among the indirect causes, hepatitis (29.93%) followed by anaemia (17.82%). However in our study pulmonary embolism is found to be the leading cause and medical disorders complicating an already existing obstetric complication is the main cause of maternal deaths. Thus, suggesting a need for specialised care and provision of intensive care management, mechanical ventilation and expert physician assistance. There is a need to upgrade the existing infrastructure of the district hospital with availability of skilled physician care.

Maternal mortality rate can be reduced by improving the quality of care to the mothers at all levels of district health system, adequate transport facilities, health education of masses, continued educational efforts to upgrade the knowledge of trained birth attendants (TBA) and a culturally sensitive integration of TBA's into Govt. Programme¹³. Need for availability of blood banks / blood storage units at all first referral units has to be emphasized. It is necessary even in urban areas to channel the working of emergency obstetric care as envisaged in the RCH phase II in India. The basic obstetric care for all, and early detection of complications and management of emergencies services need to be seriously looked into in the urban areas as well.

CONCLUSION

Maternal Mortality in the uneducated women of rural background is a daunting problem in district hospitals of India where the work load is tremendous and women with severe morbidities are referred from surrounding areas. In this study many of the dying women had medical disorders complicating the obstetric complication. There was an urgent need for intensive care, respiratory support with mechanical ventilation and physician care. Indirect causes such as anaemia contributed to most of the deaths. Thus there is a need to improve basic and comprehensive emergency obstetric care facilities which should be well distributed to serve with the key functions of availability of antibiotics and oxytocics, facilities for assisted vaginal deliveries, caesarean section, manual removal of placenta and blood transfusion. Up gradation of present infrastructure with availability of intensive care and component transfusion facilities have to be looked into. Other interventions for reduction of MMR are proper antenatal care, risk screening, skilled personnel at child birth, good transport facilities, family planning and safe abortion services and health education. The current study highlights the importance of conducting maternal death review in delineating the causes of maternal deaths and finding cause specific and need based local solutions for curtailing maternal mortality.

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Table 1: Distribution of women according to socio demographic characteristics and antenatal care

Charecteristics	Mean	Percentage	95% CI
Age	25.8 ± 2.97 years		
<19 yrs		0	-
19 - 24 yrs		40	0.03 to 0.76
25 - 29 yrs		30	-0.04 to 0.64
30 – 34 yrs		30	-0.04 to 0.64
35 yrs & above		0	-
Area of residence			
Urban		0	-
Rural		100	-
Socioeconomic status			
Upper (I)		0	-
Upper middle (II)		0	-
Lower middle (III)		0	-
Upper lower (IV)		30	-0.04 to 0.64
Lower (V)		70	0.35 to 1.04
Gravida	2.1 ± 0.87		
Primi		20	-0.10 to 0.50
Gravida 2		60	0.23 to 0.96
Gravida 3		10	-0.12 to 0.32
Gravida 4		10	-0.12 to 0.32
Previous live births			
0		40	0.03 to 0.76
1		40	0.03 to 0.76
2		10	-0.12 to 0.32
3		10	-0.12 to 0.32
Referred from other healthcare unit			
Yes		40	0.03 to 0.76
No		60	0.23 to 0.96
Antenatal care			
Yes		30	-0.04 to 0.64
No		70	0.35 to 1.04

Table 2: Obstetric Complications, Labour and Delivery status

Characteristics	Proportion	95% CI
Labor status at the time of admission:		
Not in labor	50	0.12 to 0.87
In labor	40	0.03 to 0.76
Post partum	10	-0.12 to 0.32
Stage of labor when death occurred		
Antepartum	20	-0.10 to 0.50
Intrapartum	20	-0.10 to 0.50
Post partum	60	0.23 to 0.96
General condition at admission		
Stable	50	0.12 to 0.87
Unconscious	20	-0.04 to 0.64
Serious	30	-0.10 to 0.50
Onset of complication to admission interval		
< 1hour	40	0.03 to 0.76
2-12 hours	40	0.03 to 0.76
13-24 hours	10	-0.12 to 0.32
25-48 hour	10	-0.12 to 0.32
>48 hours		0.10 to 0.50
Admission to death interval		
< 1 hour	20	0.10 to 0.50
2-24 ours	50	0.12 to 0.87
24 – 48 hours	10	0.12 to 0.32
>48 hours	20	0.10 to 0.50
Associated obstetric complication		
Anemia	70	0.35 to 1.04
Pregnancy Induced Hypertension	40	-0.04 to 0.64
Eclampsia	10	0.03 to 0.76
Antepartum Hemorrhage	10	-0.12 to 0.32
Septic abortion	10	0.10to 0.50
Intrauterine death	10	0.10 to 0.50
Previous cesarean section	0	-
Phase of labor when death occurred		
Latent	10	-0.12 to 0.32
Third	20	-0.10 to 0.50
Undelivered	60	0.23 to 0.96
Not applicable	10	-0.12 to 0.32
Duration of labor		
< 6 hrs	20	-0.10 to -0.50
6-12 hrs	20	-0.10 to -0.50
12-24 hrs	10	-0.12 to 0.32
>24 hrs	20	-0.10 to -0.50
Not available	20	-0.10 to -0.50
Not applicable	10	-0.12 to 0.32
Delivery		
Vaginal	60	0.23 to 0.96
Undelivered	40	0.03 to 0.76
Cesarean Section	0	-
Perinatal outcome		
IUD	30	-0.04 to 0,64
Live birth	20	-0.10 to 0.50
Still born	10	-0.12 to 0.32
Not applicable	40	0.03 to 0.76
Intervention:		
Blood Transfusion	40	0.03 to 0.76
Surgical Intervention	0	-
Physician assistance	20	0.23 t0 0.96