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Original Research Article

Four years' maternal mortality updates of a high referral burden teaching hospital of Eastern Uttar Pradesh, India

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ABSTRACT

Background: Maternal mortality is still a major challenge in developing countries but in our hospital, it touches the extreme height of MMR. The target of the study is to assess the cause of maternal mortality at Sir Sunder Lal Hospital, Banaras Hindu University, Varanasi, India.

Methods: Data collection was done from the patient maternal mortality records of hospital between 2013 to 2016. Study comprises only maternal mortality cases. Total 165 maternal deaths were included in this study.

Results: Maternal mortality ratio is extremely high as compare to other studies. In an increasing trend, in the year 2015 MMR was highest. Moreover, we found direct causes accounted 77.5% of total maternal deaths Hypertensive disorders and eclampsia is the most frequent cause of deaths which represented 33.3%. We found a trend of increased MMR with Increased unbooked cases. 21.2% of total dead women couldn't get beds in ICU because of not vacancy of beds and 18.8% of total women died due to non-affordability of ICU expenses.

Conclusions: Our hospital is a high burden referral apex centre of eastern Uttar Pradesh in India which experience mostly referred cases from the periphery. PPH and hypertensive disorder are two major causes which lead to deaths. Cardiovascular dysfunction is most accounted for deaths. Mostly patients were needed ventilatory support to survive but lack of separate ICU and improper antenatal visits leads to MMR higher. However, many other factors like ill-literacy, poor transportation, poor referral note, poor socio-demographic status should be dealt to incline the MMR.

Keywords: Eclampsia, Hypertensive disorders, Maternal mortality

INTRODUCTION

Pregnancy is one of the most joyful periods of a woman's life while maternal death is an awful and tragic event. Complication during pregnancy and child birth are the major cause of maternal mortality and morbidity among women of reproductive age.

Tenth revision of international classification of disease (ICD-10) defined maternal death as maternal death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by

pregnancy or its management but not from accidental or incidental cause.¹ Every day approximately 830 women die from preventable cause of pregnancy or child birth related complications globally. Approximately 303000 women deaths were estimated due to pregnancy and obstetrics complications.²

According to the World Health Organization (WHO) factsheets, almost 99% of maternal deaths occurred in developing countries with low recourse settings and most could be prevented. Maternal mortality ratio is declined by only 2.3% per year between 1990 and 2015. India (17%) and Nigeria (14%) both countries account one

third of all global maternal deaths. UNICEF revealed, annually 55000 women die due to preventable pregnancy and obstetrics related causes in India.³

The present study is aimed to determine the trend of MMR over study period and to evaluate the other aspects which relate to the high MMR in our hospital and need of separate ICU consolidated with the labor and delivery suites. The specified objectives of this study is to find out the proportion of women died due to lack of ICU facility, but their lives could be saved if ICU facilities were provided in time, the dead women who were needed to treat in ICU, to determine the frequency of causes of death which could be treated if ICU could be available, to determine the socio demographic status and availability of ICU beds associated with maternal mortality.

METHODS

This retrospective study was conducted in tertiary care teaching hospital that is one of the highly burden carrying large number of referrals from maternity homes, Primary health centers, community health centres in Eastern Uttar Pradesh. The four years study conducted from 1 January 2013 to 31 December 2016. We included 165 women, who were admitted in Department of Obstetrics and Gynecology and died due to different causes of death while these patients were either antenatal at the time of admission or were within 42 days of their delivery whether they delivered inside or outside our hospital. We excluded late maternal deaths.

Maternal mortality ratio was calculated by dividing the number of maternal deaths by the number of live births during the study period and multiplied by 100,000.

The maternal death records were retrieved from the departmental record section. Data like reasons for admission, age, parity, reasons of mortality, cause of death, socio-economic status, education, bed vacancy in ICU and affordability of patients for ICU facility were retrieved. We characterized the patients with respect to the need of their ICU admission.

RESULTS

During the study period, there were total 165 maternal deaths and 102 intrauterine deaths between January 2013 and December 2016.

Table 1: Hospital status during study period.

	2013	2014	2015	2016
Total maternal Admissions	2791	2974	2666	2675
Total deliveries	1991	2089	2270	2372
Total live birth	1951	2020	2185	2283
Total IUD	40	69	85	89
Total maternal death	36	33	54	42
MMR per 100,000 LB	1845	1633	2471	1839
Mean of MMR	2002			

Table 2: Clinical profile.

Profile	2013	2014	2015	2016	Total	
Age in years	<20	-	2	-	2	
	21-25	19	20	29	28	96 (58.1%)
	26-30	11	7	14	9	41 (24.8%)
	31-35	3	1	6	4	14 (8.4%)
	36-40	2	2	2	1	7
	41-45	1	1	3	-	5
	Mean age in year	24.6	25.3	26.8	25.5	25.5
Gestational age (GA)/status at admission	<28 week	3	1	9	7	20
	28 to 34 weeks	10	4	17	8	39 (23.6%)
	34 to 38 weeks	12	15	13	13	53 (32.1%)
	38 to 40 weeks	8	9	10	8	35 (21.2%)
	>40	3	4	5	6	18
	Mean GA in week	34.4	36	35.2	34.6	35.05
Status at death	Died undelivered	3	2	7	1	13 (7.8%)
	Primiparous	11	19	15	13	58 (35.1%)
	Multiparous	22	12	32	28	94 (56.9%)
ANC registration	Booked	4	5	7	9	25 (15.1%)
	Unbooked	32	28	47	33	140 (84.8%)

As the Table 4 shows the epidemiological characteristics of maternal deaths, maximum deaths (58.1%) were

reported in the age of 21 to 25 years and second highest deaths (24.8%) were between 25 to 30 years. 56.9%

women died with multiparity and 35.1% with primigravida. Total 13 women died undelivered between the study periods. However, in 2014 maternal mortality

was high in primiparous women. Mostly deaths lied in the Gestational age group of 34 to 38 weeks.

Table 3: Socio-demographic profile.

Socio-demographic profile		2013	2014	2015	2016	Total
Residence	Rural	19	20	31	24	94 (56.9%)
	Urban	6	5	9	5	25 (15.1%)
	Urban slum	11	8	14	13	46 (27.8%)
Economic status (Rs /- per annum)	Low <100000	19	18	28	22	87 (52.7%)
	Middle (1 to 2 lakh)	9	12	17	14	52 (31.5%)
	Upper (>2lakh)	7	3	9	6	25 (15.1%)

Table 4: Causes of maternal deaths.

Cause of death in the hospital	2013 (N=36)	2014 (N=33)	2015 (N=54)	2016 (N=42)	Total (N=165)
Direct cause					128 (77.5%)
Hypertensive disorders and eclampsia	11	8	12	9	40 (24.2%)
Haemorrhage	7	13	19	16	55 (33.3%)
Puerperal infection/sepsis	4	3	4	2	13 (7.8%)
Obstructed labor (including uterine rupture)	2	1	2	2	7 (4.2%)
Amniotic fluid embolism	1	1	2	-	4 (2.4%)
Abortion related	1	2	3	2	9 (5.4%)
Total					
Indirect cause					37 (22.4%)
Severe anaemia	3	2	4	3	12 (7.2%)
Heart disease	1	1	2	2	6 (3.6%)
Jaundice	2	1	3	3	9 (5.4%)
HIV 1a	1	-	-	1	2 (1.2%)
Disseminated TB	1	-	1	1	3 (1.8%)
Malignancies (liver secondaries)	1	1	2	1	5 (3.0%)

Table 5: Organ dysfunctions required for ICU admission (final cause of ICU admission).

Organ systems	2013	2014	2015	2016	Total
Hematological / thrombocytopenia	6	4	8	4	22
Cardiovascular	8	9	11	8	36
Hepatobiliary, GI	4	3	4	3	14
Neurological	2	2	5	2	11
Septicemia	4	2	7	4	17
DIC, coagulation	2	2	4	4	12
Renal	1	2	3	3	9
ARDS, pulmonary	2	1	2	4	9
Embolism	1	2	1	1	5
Metabolic / burns	1	1	1	2	5
Specific infection (TB, malaria, HCV, HBAG, HEV etc)	2	1	2	2	7
Multi-organ dysfunction	3	4	6	5	18

Most of the maternal deaths were from rural area (56.9%) and slum urban (27.8%) which also associated with the low economic status (52.7%), 70.3% unbooked patients were reported in the study period. High MMR also reflects the poor community. Due to a high burden referral center 84.8% of unbooked patients died in this 4 years of period.

Table 6: Treatment needed in ICU.

Treatment needed in ICU	Number			
	2013	2014	2015	2016
Ventilatory support	11	15	19	14
Blood transfusion	16	10	13	10
Fresh frozen plasma transfusion	3	6	8	5
Dialysis	2	3	5	6
Platelets transfusion	1	2	8	5
Surgical intervention	13	8	14	12

When we analyzed the leading cause of death in four-year period direct cause accounted 77.5% of deaths. Hypertensive disorders and eclampsia (33.3%) was convicted highest and Obstetrics hemorrhage (24.2%) were at second position while Indirect cause are reported 22.4% and severe anemia accounted highest for maternal death (7.2%). Cardio-vascular system dysfunction was the most common organ dysfunctions which lead to the

maternal mortality. Among 165 women ventilator support, blood transfusion and surgical intervention were required most in the intensive care unit (ICU) to save the life but only 53.9% women could get ICU admission, 21.2% could not get ICU facility due to unavailability of vacant beds although 6.6% women's family refused to take ICU due to other reasons and 18.8% of died women's family couldn't afford the ICU.

Table 7: ICU admission profile.

Year	Bed not vacant in ICU	Not affordable	Admissions in ICU	Refusal and other reason	Total
2013	7	5	21	3	36
2014	9	7	15	2	33
2015	11	9	29	5	54
2016	8	9	24	1	42
Total mortality	35	30	89	11	165
Percentage (%)	21.2	18.8	53.9	6.6	

DISCUSSION

The maternal mortality rate (MMR) in developed countries in 2015 was 12 per 100000 live births whereas developing countries account 240 per 100000 live births which is a vast difference of 15% higher than developed countries. Almost all maternal deaths occurred in developing countries. High numbers of maternal mortality reflect the need of more development in health care services and management. With a high MMR India accounts one third of total maternal deaths of the world. MMR depends on many factors including socio-economic status, literacy rate, and availability of health care facilities.⁴

Most maternal deaths are preventable as the health care solutions or complication management facilities are well known. Pregnancy and child birth can be the most complicated situation for women which can lead to death. Such situation can be overcome in critical care unit if provide timely. Critical care practitioners have thorough knowledge and equipments to control the complication arise due to pregnancy and child birth.⁵ This study was done to review the aspects of maternal deaths and need to save the women's lives.

In 4 years of study period we calculated mean MMR 2002 per 100000 live births as it is an intensified MMR. Same study done in our hospital by Jain M et al calculated 2269 mean MMR.⁶ Our hospital is a tertiary referral teaching hospital which caters to all high risk and complicated cases from different parts of eastern Uttar Pradesh, vast area of western part of Bihar state and border areas of Madhya Pradesh state. Although accurate MMR calculation is difficult to access, and any hospital cannot be a true representative of that area.⁶

Majority of women were from age group of 21 to 25 (58.1%). Dasari P et al also found comparable result of major mortality in the 21 to 25-year age group and multiparous women as the present study. Most women died in 34 to 38 weeks gestational age (32.5%) same as Dasari P study.⁴ In the present study hemorrhage headed the direct cause list with 33.3% as observed in Ramachandra PM et al.⁷ Jain M et al found relevancy with us in ANC registration status.⁶ Most of the causes are preventable. 33.3% of total deaths due to hemorrhage associated with co-morbidity like anemia. Delay in recognition of PPH, treatment, referral like factors were analyzed in major of cases.

Total 7 cases were registered of inter uterine rupture. 9 deaths attributed to abortion related complications and 4 cases to amniotic embolism. Significant numbers of deaths were associated with organ dysfunctions. Cardiovascular dysfunctions (36 cases) were most common in study period. Mostly death causes were associated with the need of ventilator support, blood transfusion, platelets and frozen plasma transfusion and dialysis. Many cases were required surgical interventions. Various researchers supported similar therapeutic measures that could save the lives.⁸⁻¹¹

Extremely high MMR was associated with the illiteracy, rural, slum, low economic status families which is emphasize the relation of death with that low socio-economic women. 18.8% of women could not afford the ICU facility, 21.2% of total women died due to not availability of beds in ICU, only 53.9% of total died women could get bed in ICU.

There is lack of separate ICU for obstetrics patients in our Hospital. According to the Irene YV antenatal care

present at the periphery can prevent the women from majority of complications and deaths related to the obstetrics and pregnancy.¹² Critically ill condition can be result in to death so early referral to tertiary care center coupled with ICU should be an approach to reduce the MMR. Proper implementation of National Rural Health Mission (NRHM) scheme can play a vital role in saving of many mothers' lives.

CONCLUSION

Maternal mortality rate corresponds the value of women life. Extremely high mortality has many factors including socio economic factor and low resources in health care facilities. Our region accounts a huge deprived population and our hospital is a high referral centre established in low setting population which is required multidisciplinary approach about cheaper and high quality of health care facilities. In the present study mostly, women were required ICU facilities, but half of the women could not get ICU facilities. Inclusion of low cost and separate intensive care unit associated to labour and obstetrics suits is essential to achieve goal of reduced MMR. However, many other factors like ill-literacy, poor transportation, poor referral note, poor socio-demographic status should be dealt to incline the MMR.

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