Audit of Severe Acute Maternal Morbidity in a Tertiary Health Care Centre of Eastern India Over Past 6 Years-A Retrospective Study

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Abstract

Background: According to WHO, Maternal Near-Miss is when "a woman nearly died but survived a life-threatening condition/ organ dysfunction that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy".

Material & Methods: This is a Retrospective Cohort study conducted at the Department of Obstetrics and Gynaecology (OBG) in a tertiary healthcare center, over 6 years, from July 2017 to July 2023. Data was noted for all the women with an intrauterine or ectopic pregnancy, who were shifted to the Intensive Care Unit, intrapartum, peripartum or up to 42 days postpartum over the past 6 years from July, 2017 up to July, 2023 and analyzed.

Results: Among 188 Severe Acute Maternal Morbidity (SAMM) cases, Maternal Near Miss (MNM) was seen in 174 females, which included all the 22 ectopic pregnancies and our Mortality Index was 7.4 %. The maternal Near near-miss incidence Ratio was 17.6 per 1000 live births.

Conclusion: Neurological Dysfunction, Sepsis and Cardiac Dysfunction have the maximum odds of Mortality in our setup. Hence, we need to work on their identification and management more.

Introduction

WHO defines MNM as "when a female nearly dies but survives a life-threatening complication or organ dysfunction, during pregnancy, childbirth or within 42 days of termination of pregnancy".

Severe Acute Maternal Morbidity (SAMM) includes both Maternal Mortality (MM) and Maternal Near misses (MNM).

The following criteria are used to classify SAMM-

1. Organ-Specific
2. Clinical
3. Laboratory
4. Management Based

In this study, the management-based criteria has been used-

- Continuous use of Vaso-Active Drugs (like Dopamine, Adrenaline, Noradrenaline)
- Intubation and more than 60 min ventilation- due to non-anesthesia-related causes
- Sepsis or Hemorrhage needing Hysterectomy
- Acute Renal Failure requiring Dialysis
- Massive Blood Transfusion (>5 pint PRBC)
- CPR was initiated

Maternal deaths have often been analyzed for the level of health care. However, the prevalence of MNM has been observed to be 8.2% in developed nations, 10.1% in developing ones and around 14.1% in varying set-ups of India. Observing the early symptoms and signs of MNM will help in timing the proper intervention to not only save more lives but also prevent long-term complications in patients.

The study was aimed at observing the various conditions leading to life-threatening states in mothers to calculate the indicators of MM and MNM for this hospital.

The indicators used are-

Mortality Index	= MM/SAMM x 100%
Severe Maternal Outcome Ratio	= SAMM/Total Live Births (LB) X 1000
Maternal Near Miss Incidence Ratio	= MNM/Total LB X 1000
Maternal Mortality Ratio	= MM/Total LB x 1,00,000
Maternal Near Miss : Mortality Ratio	= MNM/MM

Methodology

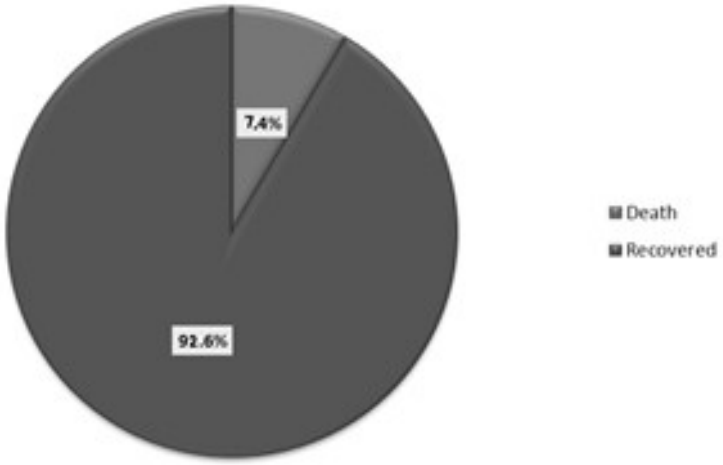
This is a Retrospective Cohort study conducted at the Department of OBG, a tertiary healthcare center, over 6 years, from July 2017 to July 2023. Based on Management

Based Criteria for SAMM cases, for women with an intrauterine or ectopic pregnancy, who were shifted to the Intensive Care Unit, intrapartum, peripartum or up to 42 days postpartum over the past 6 years from July, 2017 up to July, 2023, demographic data, maternal and fetal outcomes were noted.

Indices for SAMM were calculated for our center and compared with the national and international averages.

Statistical Analysis

Data was entered in table form in MS Excel and coded for ease of work-up. The Chi-Square Test was applied to find any significant association between Demographic variables and Complications during Pregnancy & Maternal Near-Miss and Maternal Mortality. Significance (p-value) was set at 0.05. Logistic regression analysis was done for the Odds of Mortality or Near-Miss associated with Complications During Delivery for the significant variables.



Results

Among the 188 SAMM cases, there were 44 (7.4%) Maternal Mortalities. However, a significant majority- 174 (92.6%) were Maternal Near Miss, ie, recovered.

Following is the data analysis for the 166 Intrauterine Pregnancies (IUP).

Vaginal Delivery was conducted in 48 (28.9%) cases and Surgery was needed in 118 (71.1%) cases. 14 (8.4%) patients sustained trauma during the intervention.

The fetal outcomes observed- were 122 (73.4%) live births, 1 (0.6%) neonatal death, 2 (1.2%) stillbirths, 23 (13.9%) intrauterine fetal deaths (IUFD) and 18 (10.8%) abortions.

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Table 1- Association of Demographic Variables with MNM & MM

Demographic Variable		Death		MNM Recovered		Significance	
		No.	%	No.	%	chi sq	p-value
Age	18 - 25 yr	4	6.5%	58	93.5%	2.85	0.583
	26 - 30 yr	8	12.5%	56	87.5%		
	31 - 35 yr	2	7.1%	26	92.9%		
	36 - 40 yr	0	0.0%	11	100.0%		
	41 - 45 yr	0	0.0%	1	100.0%		
Gestational Age	Preterm	12	9.4%	115	90.6%	0.72	0.396
	Term	2	5.1%	37	94.9%		
	Post-term	0	0.0%	0	0.0%		
Education	< 10th	8	9.0%	81	91.0%	0.08	0.782
	>= 10th	6	7.8%	71	92.2%		
SE Status	Above Poverty Line	10	9.2%	99	90.8%	0.23	0.635
	Below Poverty Line	4	7.0%	53	93.0%		
ANC (>=4 visits)	No	3	12.5%	21	87.5%	0.60	0.438
	Yes	11	7.7%	131	92.3%		

Table 2- Association of Complications during Delivery with MNM & MM

Complication during Delivery		Death		MNM Recovered		Significance	
		No.	%	No.	%	chi sq	p-value
Uteroplacental Disorders	Absent	9	9.5%	86	90.5%	0.31	0.577
	Present	5	7.0%	66	93.0%		
Hepatobiliary System	Absent	9	6.0%	140	94.0%	10.79	0.001
	Present	5	29.4%	12	70.6%		
Cardiac Dysfunction	Absent	6	4.4%	131	95.6%	16.69	<0.001
	Present	8	27.6%	21	72.4%		
Renal Dysfunction	Absent	7	4.6%	144	95.4%	31.21	<0.001
	Present	7	46.7%	8	53.3%		
Respiratory Abnormalities	Absent	4	3.1%	125	96.9%	21.31	<0.001
	Present	10	27.0%	27	73.0%		
Neurological dysfunction	Absent	9	5.8%	147	94.2%	23.81	<0.001
	Present	5	50.0%	5	50.0%		
Metabolic Abnormality	Absent	6	4.3%	133	95.7%	35.01	<0.001
	Overt/ Type 2 DM	1	12.5%	7	87.5%		
	Gestational DM	0	0.0%	5	100.0%		
	Others	7	50.0%	7	50.0%		

HDP	Absent	8	11.6%	61	88.4%	1.68	0.432
	Gestational HTN	6	6.4%	88	93.6%		
	Chronic HTN	0	0.0%	3	100.0%		
Infection	Absent	2	1.6%	126	98.4%	34.19	<0.001
	Present	12	31.6%	26	68.4%		
Hematological disorders	Absent	4	4.3%	90	95.7%	7.15	0.028
	Congenital	0	0.0%	8	100.0%		
	Acquired	10	15.6%	54	84.4%		
Trauma/ Complications in Surgery	No	10	6.6%	142	93.4%	10.50	0.005
	Yes	4	28.6%	10	71.4%		

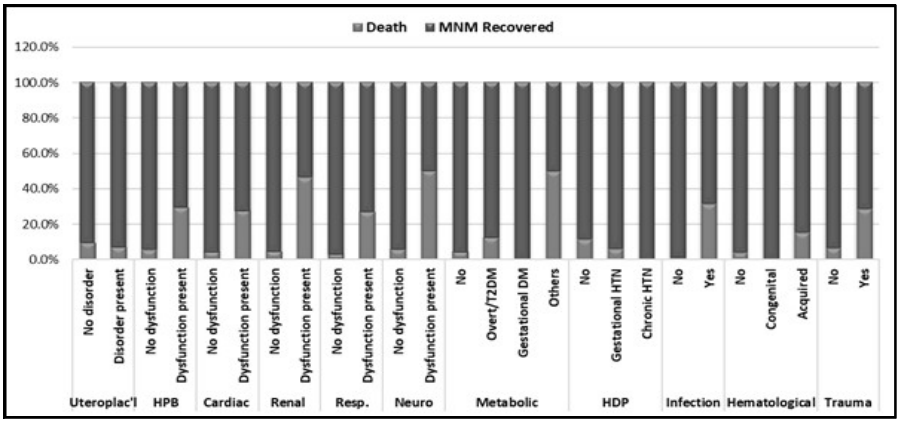

Table 3- Logistic Regression Analysis for Relationship of MM with Significant Factors

Independent Variables	Positive Coefficient B	SE	p-value	OR
Hepato Biliary Dysfunction	0.06	1.46	0.969	1.06
Cardiac Dysfunction	2.17	1.13	0.055	8.75
Renal Dysfunction	1.40	1.06	0.188	4.04
Respiratory Dysfunction	0.91	1.10	0.408	2.49
Neurological Dysfunction	4.12	1.69	0.015	61.60
Metabolic Abnormality			0.801	
Overt/T2DM	2.48	4.24	0.559	11.90

Gestational DM	15.81	17328.71	0.999	Large
Infection	3.49	1.40	0.013	32.85
Hematological disorders			0.602	
Congenital	-1.12	1.11	0.314	0.33
Acquired	17.66	11762.28	0.999	Large
Trauma	1.28	1.36	0.348	3.60

Conclusion

For our institute,

Mortality Index = 8.4% (7.4%)

as opposed to the Maternal Mortality Rate in India (SRS 2018-20) 97 per 100,000 live births and the Maternal Mortality Rate in Odisha (SRS 2018-20) 119 per 100,000 live births.

Severe Maternal Outcome Ratio = 16.8 per 1000 live births (19.1)

Maternal Near Miss Incidence Ratio = 15.4 per 1000 live births (17.6)

which is within the average global range for developing countries 15-40.

Maternal Mortality Ratio = 142 per 100,000 live births.

Maternal Near Miss : Mortality Ratio = 10.85 (12.42),

which is better than that of under-developed countries of Africa, from 5 to 12 while for India it has been observed to be up to 22.

As all the 22 Ectopic Pregnancies survived, we analyzed the data for Intrauterine Pregnancies.

It was found that there was no Significant Association with the demography of the study population including whether they've undergone regular Antenatal checkups (>/= 4 visits).

Out of the complications surrounding delivery, for Utero-Placental Disorders that is Placenta Accreta Spectrum, IUGR, Preterm Births and Scar Dehiscence and Rupture and for Hypertensive Disorders of Pregnancy the association was not significant which is contrary to many other studies done in India which claim Hemorrhage and Hypertension as the Most Common causes of Maternal Near Miss-

Study (Year)	Study Location (Country)	Most Common Cause of MNM (%)
Khosla (1998)	Teaching Hospital (India)	Hemorrhage (29.9) Hypertension (22.7) Severe Anemia (16.4)

Taly (2001)	Teaching Hospital (India)	Hemorrhage (60) Hypertension (22.7) Sepsis (4)
Chhabra (2005)	Teaching Hospital (India)	Hemorrhage (34) Eclampsia & Pre-Eclampsia (34) Sepsis (12)
Gupta (2015-2016)	Teaching Hospital (India)	Hemorrhage (40.5%) Preeclampsia/Eclampsia (24.3%) Sepsis (13.5%) Severe Anemia (8.1%)

For the other significant factors, applying Logistic Regression, Neurological Dysfunction, Sepsis and Cardiac Dysfunction had the maximum odds of Mortality in our setup.

It could be explained with the MNM 3 Delay Model-

1. The mother and her family's awareness and status;
2. The access to healthcare- referral chains leading to our hospital and the barriers- physical or financial and
3. The facilities in our setup.

Ours is a tertiary referral center covering most of Odisha including remote areas. Most cases referred are in moribund state, which despite the treatment, are too late to receive the same and hence, are prone to succumb. This can be improved with better transport services, ANC and staffing at grassroots levels of healthcare centers, coming under our umbrella.

Conflict of interest: None

Disclaimer: Nil

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