A Dissertation on

MATERNAL NEAR MISS MORBIDITY-AN ANALYSIS OF 50 CASES

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BONAFIDE CERTIFICATE

Certified that this dissertation is the bonafide work of Dr. M.PARAMESWARI on "MATERNAL NEAR MISS MORBIDITY –AN ANALYSIS OF 50 CASES" during her M.S., (Obstetrics & Gynaecology) course from April 2011 to April 2014 at the Institute of Social Obstetrics, Government Kasturba Gandhi Hospital for Women and Children, Madras Medical College, Chennai.

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DECLARATION

I solemnly declare that the dissertation titled **"MATERNAL NEAR MISS MORBIDITY –AN ANALYSIS OF 50 CASES"** is done by me at **INSTITUTE OF SOCIAL OBSTETRICS AND GOVT. KASTURBA GANDHI HOSPITAL FOR WOMEN AND CHILDREN,** Madras Medical College under the guidance and supervision of **Prof. Dr.RAMANI RAJENDRAN M.D., D.G.O.,** Professor of Obstetrics and Gynaecology, Madras Medical College, Chennai.

This dissertation is submitted to the Tamilnadu Dr. M.G.R Medical University towards the partial fulfillment of requirements for the award of M.S. Degree (Branch II) in Obstetrics and Gynaecology.

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ABSTRACT

AIMS AND OBJECTIVES: To analyse , in a local context, the incidence of MNMM,ADVERSE EVENTS and DISORDERS underlying MNMM (as per WHO criteria),sociodemographic variables, contributing factors and patterns of near miss situations and maternal deaths.

DESIGN: Facility- based observational study

STUDY POPULATION: All women with MNMM as identified by WHO comprehensive criteria.(2009)

MAIN OUTCOME MEASURES:MNMM incidence ratio, Mortality index

RESULTS: In the KGH study, 76% of MNMM were in late pregnancy (> 28 weeks),90% of MNMM patients were educated;52% of MNMM were multigravida while 34% were primigavida; 64% came directly to the hospital; 32% had one referral between health facilities; and 4% had two referrals between health facilities. 66% were near miss at the time of arrival; majority of this group had Hypertensive disorders of pregnancy as the adverse event; 34.% became near miss after admission to hospital. The most common adverse event in this group of patients was Hemorrhage. The Cesarean Section Rate In KGH was 52.52% Of All Hospital Deliveries while the Cesarean Section Rate Among

Near Miss Women Delivering At KGH Was 88%Multiparity, anemia ,diabetes and previous caesarean section seem to be risk factors for developing MNMM. Hypertensive disorders of pregnancy(52%) , Major obstetric Hemorrhage(42%) and Cardiac causes (6%) were the common causes.

CONCLUSION: The MNMM INCIDENCE RATIO in this study is 0.8 per 1000 live births.This is comparable to High income developed countries where it is between 0.6 and 1%.The Mortality Index is low;at 0.05,it reflects good quality of care.The causes of Near Miss reflect the causes of maternal death. Near miss analysis is worth presenting in national indices as a surrogate for maternal death

KEY WORDS: Maternal near miss morbidity,hypertensive disorders of pregnancy,obstetric hemorrhage,maternal near miss morbidity incidence ratio

CONTENTS

INTRODUCTION

“CHILDBIRTH IS REBIRTH FOR THE MOTHER ”

“A PREGNANT WOMAN HAS DEATH ON HER HEAD”

These ancient sayings summarize the unpredictables and dangers faced by pregnant women.

“Women are not dying because of diseases we cannot treat. They are dying because societies are yet to make the decision that their lives are worth saving.”

--Mahmoud Fathalla, WHO

Maternal mortality is described as "just the tip of the iceberg", implying that there is a base -maternal morbidity-which remains largely undescribed

For each woman who dies, many will survive but often suffer from life long morbidity. Since women are handicapped by the very same conditions which cause maternal deaths,when we reduce the risk factors for maternal deaths we can also reduce the number of women suffering from severe morbidities.

In the airline industry, an investigation of the causes and contributing events is carried out not only when two aeroplanes collide with each other ,but also when they pass within 100 feet of each other because it is a potential disaster which was averted due to extraordinary skill of the navigating team or sheer good luck.

In health care literature NEAR MISS refers to a severe life threatening condition that did not cause death-but had the potential to do so. An ill woman who would have died but for the good care received or sheer good luck is a Near Miss case. . The investigation of near-miss, provides superior information about disease burden and indicates quality of care in mothers. It can also broaden understanding of factors that contribute to both maternal morbidity and mortality

This is a small scale study to analyse maternal near miss morbidity in a local setting.

AIMS AND OBJECTIVES

To analyse in a local context,

- incidence of MNMM
- ADVERSE EVENTS leading to MNMM(as per WHO criteria)
- DISORDERS underlying MNMM (as per WHO criteria)
- sociodemographic variables among MNMM
- contributing factors to near miss situations
- facilities and skills needed to handle these near miss situations.
- the patterns of maternal death and morbidity

REVIEW OF LITERATURE AND HISTORICAL BACKGROUND

Rochdale, an industrial town in England, in 1928, had a MATERNAL MORTALITY RATE of over 900 per 100,000 live births, more than double the national average of UK. This led to a lot of local introspection and the Public health department conducted a confidential enquiry of maternal deaths both in the community and in hospitals. Action on the results of this public enquiry reduced the maternal mortality to 280 per 100,000 pregnancies , the lowest in UK.

This reduction took 6 years all the more remarkable because it happened at a time of peak economic depression. According to the report : “it is important to know that remarkable outcomes were got by a change in method and spirit with no change in the personnel or substantial increase in cost”. The review reported that the leading causes of mortality-sepsis, haemorrhage, and eclampsia – were compounded by the mothers’ lack of knowledge on warning signs in pregnancy and increasing use of forceps and other techniques to hasten the delivery of women.

In 1900, there were about 700 maternal deaths per 100,000 births in the USA , the same MMR seen in developing countries today.But, a hundred years later, maternal death has fallen precipitously to less than 10 per 100,000 births. Similar decrease has happened in other high income countries also; the decline started even before 1900 in Sweden. By 1950, all over the developed world MMR plateaued at levels much below 100 for 100,000 births.

In creating the change, the introduction of new drugs and technologies in preventing and managing obstetric complications played an important role. But this was not enough.It was the political will to bring these technologies into practice that made a great change. This was made possible by two conditions:

(a) the realization that social, economic and political empowerment of mothers was a requirement for social wellbeing and social peace.

(b)the awareness created by professionals about the magnitude of the problem

However,a mere change of health care models from developed countries to developing countries was not working.To further

understanding on this subject, the International Conference on Primary Health Care was conducted in 1978 by WHO and UNICEF .

In this conference, all nations decided to develop a commitment to form comprehensive medical programmes . These addressed the underlying social, political andeconomic resons of poor-health. It was decided for Primary health care (PHC) to be universal.

In the 1970s and 80s, improvements in statistical techniques and the availability of good quality data revealed the magnitude of neonatal deaths and morbidity.But there was not much information on maternal deaths or morbidity.It was only in 1985 that WHO conducted the first community study on maternal deaths in developing countries.It revealed that every year more than a million mothers are dying,mainly in developing nations due to preventable causes.

The WHO, World Bank and UNFPA jointly conducted

the first Safe Motherhood Conference in Nairobi. The conference declared that "…something can, should-indeed must-be done, starting with the commitment of heads of states and governments".

The Conference was the starting point of the Safe Motherhood Initiative (SMI). Later, the Inter-Agency Group (IAG) by UNDP, UNICEF, IPPF joined SMI . The Population Council with Family Care International (FCI) served as an informal secretariat.

The relative neglect of women's health compared with the attention given to child survival and health was realized. This point was forcefully made by Allan Rosenfield and Deborah Maine in their outstanding article 'Where is the M in MCH?'

In New York in 1989,the Summit for Children was held. It was attended by executive heads of UN agencies, heads of state, NGOs and senior representatives of international development community and countries. Reduction in maternal mortality and increases in antenatal attendance were some of the goals decided in the Child Summit.

World Health Day 1998 was devoted to safe motherhood by WHO; the slogan was 'Pregnancy is special: let's make it safe'. Around the world, , theatrical presentations, street parties, marches, poster

campaigns and media events focused on safe motherhood. In Washington, DC, USA, high level politicians from the developing world and executive heads of many major international agencies and the USA first lady came together and issued a Call to Action for safe motherhood.

In the present scenario, four powerful drivers of maternal mortality are steadily showing improvement worldwide. First, the global TFR has decreased from 3.70 in 1980 to 2.56 in 2008. Although the numbers of women of reproductive age is rising, the size of the global birth cohort has remained stable due to the decrease in TFR. There is a direct effect of fertility on exposure to risk of maternal death. A decrease in TFR also leads to a decrease in MMR.It is not clear whether it is due to a causal relation or due to social change that drives both.

Second, income per head, has been rising particularly in Asia-obviously, this can affect maternal mortality through several channels ranging from nutritional status of mothers to financial access to health care.

Third, maternal educational attainment has been rising. This is another strong correlate of maternal mortality.

Finally, the increase in coverage of skilled birth attendance as in India, may have contributed to decrease in maternal mortality

Falling numbers of maternal deaths worldwide, although a heartening achievement, may lead to complacency; It may lead to recommendations based on unusual events that may not be relevance to the care of most pregnant women. The incorporation of near misses into the maternal death enquiry system might allow for more relevant data on maternal care being made applicable.

Maternal Death (MD) is the death of a woman while pregnant or within 42 days of termination of pregnancy.

Live Birth (LB) refers to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life. Each product of such a birth is considered live born.

Women with life – threatening conditions (WLTC) refer to all women who were either maternal near miss or who died. It is the sum of maternal near miss and maternal deaths (WITC=MNM+MD).

MNM incidence ratio refers to the number of maternal near miss cases per 1,000 live births. (MNM IR = MNM/LB).

Maternal near miss: mortality ratio refers to the proportion between maternal near miss cases and maternal deaths. Higher ratios indicate better care (MNM : 1MD)

MATERIALS AND METHODS

- DEFINITION OF NEAR MISS:A woman who survives a severe life threatening condition (either after receiving emergency medical or surgical intervention or otherwise)during pregnancy, abortion, childbirth or within 42 days of pregnancy termination.

- There were several criteria to define near miss; But in 2009,WHO came up with a comprehensive criteria(which included clinical ,laboratory and management based criteria) for identification of near miss.

- In this study, WHO comprehensive criteria was adopted for identification of MNMM. In this study, all the maternal near miss cases which met the comprehensive criteria of WHO[annexure 1] from April 2013 to November 2013 were included.

- All women with severe life threatening conditions who fulfilled the WHO criteria were identified and flagged. Their course of hospital stay was followed closely

- A total of 50 cases were included in the study

- Each case was documented with respect to the adverse event, the disorder and organ dysfunction.

    - Coordination from different specialties was obtained, the care given was reviewed at several levels ,feedback given to the care giving team which improved their care wherever possible.

    - Those who survived were included in this study as MNMM.. Those who did not survive were not included in this study. However, a fleeting comparison with the MNMM and MD shall be made because the disorders and adverse events are the same in both categories Nearly sixteen times as many cases of near miss maternal morbidity as mortality were identified in this study.

    - Patient characteristics including age, education level, parity, booking status, whether came directly or referred from outside, hospital where antenatal care received, whether in

life threatening condition at arrival or became so later on, Gestational age at admission, h/o previous LSCS, adverse events, disorders, organ system dysfunction, surgical interventions, contributing factors, need for care in HDU setup, interventions needed in HDU, need for Blood and blood products, mode of delivery ,Neonatal outcome, need for other specialty intensive care ,duration of HDU stay and duration of hospital stay were studied.

It was decided to analyse whether MNMM was more common in teenage pregnancy or pregnancy > 35 yrs. Hence age was included in the study.

It was decided to study whether patients came directly or were referred from other hospitals.

This would indicate the strengths of the referral system and any prehospital delay in seeking care

Whether they were near miss at arrival or became near miss after admission was analysed. Near miss at arrival (within 3 to 6 hrs of admission) would reflect the effectiveness of the referral system. Patient stable, with no disorder on admission but becoming near miss later on would reflect the quality of care in the institution.

Among the patients who were stable on admission, the presence of obstetric risk factors like previous LSCS, placenta previa would be noted to see whether these contributed to the stable cases becoming near misses later on.

The Netherlands study identified primiparity as a risk factor for developing MNMM. It was desired to see whether any such relationship could be noted in India. Hence Parity was included in the study.

It was decided to study interpregnancy interval to see if Morbidity is usually associated with inter pregnancy interval <18 months.

It was desired to study whether regular antenatal care would contribute to preventing these MNMM situations. Hence, the booking status of these patients, whether they received AN care in Government or private hospitals were noted. In our Study, there was no indication to comment that government hospital AN care was found wanting. The quality of care in private and government hospitals were comparable. .On the whole, may be AN check up may not pickup and prevent near miss situations entirely.

Whether MNMM was common in early pregnancy(defined as gestational age less than 28 completed weeks) or late pregnancy(defined as gestational age greater than 28 completed weeks) or postnatally would throw light on the disorders specific to the various trimesters of pregnancy. Hence it was decided to study this.

The analysis of mode of delivery in this index pregnancy may reveal whether the pattern of mode of delivery in patients with MNMM is different from the normal patients.

Maternal care started as an offshoot of neonatal care. Based on feto infant outcome. MNMM is divided into 3 phenotypes(1):

CLASS I MNMM : maternal near miss with healthy infant

CLASS II MNMM: infant requiring NICU ADMISSION in MNMM cases

CLASS III MNMM: maternal near miss with stillbirth or infant death.

Feto infant morbidity would include all infants who need ICU care and are discharged from ICU alive.

It was decided to study these phenotypes because it would indicate how many of the maternal near misses extended into feto infant near misses. Gestational age, birth weight of live births were noted.

A WHO study in Latin American countries showed a reduced incidence of MNMM among women of no education, probably because

of the low levels of caesarean section in them. Educational level was included in the study to see if any such association could be seen in this part of the world.

Being single inflicts many social disadvantages to women and marital status was included to see if it was a risk factor for developing MNMM.

Each MNMM patient was documented separately based on the ADVERSE EVENT as given by WHO eg- hypertension, hemorrhage, cardiac disease(annexure)

Each MNMM patient was classified based on the DISORDERS as given by WHO(eg-eclampsia, severe pre eclampsia, pph, placenta previa, placenta accreta, ectopic pregnancy).This would give an idea about the frequency and morbidity patterns prevalent in this area.

All emergency surgical interventions to control hemorrhage including B Lynch suturing, Bilateral uterine artery ligation, Bilateral

internal iliac artery ligation, caesarean hysterectomy was documented in the study because this would indicate the skill level and quality of care required in the management of these patients

Any underlying medical disorder in these patients such as anemia, diabetes, hypertension was included to study their possible contributory role in the near miss situation.

The reason for being classified as near miss, the indications for shifting to HDU, the interventions done in HDU and the organ system which failed/dysfunctioned was noted because this can give important information with regard to identifying skills and health care resources and needed to manage these cases effectively.

For example, if respiratory dysfunction, is identified as a common form of organ dysfunction, then Oxygen saturation monitors, arterial blood gas analysers etc, intubation skills and ventilator facilities would be needed to manage these patients in the hospital.

Duration for which HDU care was needed and duration of hospital stay was documented.

Prolonged hospital stay was defined as hospital stay lasting for more than 7 days

The other specialties involved in the care of each patient , the number of patients shifted to specialty ICU for further care and the blood components needed were documented and analysed because it may reveal any felt needs that can be addressed.

OBSERVATIONS & RESULTS

During the study period,19185 number of patients received care in the OP[obstetrics alone] of whom 11465 were new OP patients and 7720 were old OP patients.

7592 patients were admitted and treated;

There were 5713 deliveries ;of which 2512 were Labour Natural,205 were Assisted Vaginal deliveries and 2996 were Caesarean Sections.

There were 5570 live births.

CATEGORY	NO. OF PATIENTS
OUT PATIENTS(OBS)	19185
IN PATIENTS(OBS)	7592
LIVE BIRTHS	5570
NEAR MISS	50
MATERNAL DEATHS	3

- TOTAL NO. OF NEAR MISS CASES: 50
- TOTAL NO. OF MATERNAL DEATHS =3

- Women with life threatening conditions=MNMM+MD=53
- Maternal near miss incidence ratio=MNM/LB=o.8976
- Severe maternal outcome ratio=MNM+MD/LB=0.9515
- Maternal near miss: mortality ratio =MNM:1 MD=16.6:1
- Motality index=MD/(MNMM+MD)=0.0566
- No. of Maternal Deaths during the study period=3

  [causes: Jaundice complicating pregnancy=1

  Sepsis/Type1 Respiratory failure=1

  Pulmonary edema/Severe Preeclampsia=1]

- No. of Primigravida: 20

  No. of Multigravida:26

  No. of Postnatal mothers:4

  - No. of MNMM who were unbooked and unimmunised = 6 of which 4 were ectopic pregnancies

- No. OF MNMM booked in Private hospitals = 9
- No. Of MNMM booked in GOVT. Hospitals = 35

- Total no. of Multigravida with h/o Previous LSCS:16

No. of Multigravida with h/o previous 1 LSCS:12

No. of multigravida with h/o previous 2 LSCS : 4

- No. Of multigravida with inter pregnancy interval less than 18 months:2

No. Of multigravida with inter pregnancy interval more than 18 months:21

- Total no. Of MNMM in early pregnancy(<28 wks)= 8

No. Of MNMM in first trimester: 4

No. Of MNMM in second trimester: 4

Total no. Of MNMM in late pregnancy(third trimester): 38

- No. Of MNMM with healthy infant [class I] = 18

  No. Of MNMM with feto- infant morbidity[class II] = 16

  No. Of MNMM with fetal/infant death = [class III] = 12

- No. Of MNMM with live babies = 21
- No. Of MNMM with live preterm delivery = 2
- No. Of MNMM with live term delivery = 18
- No. Of MNMM with term delivery and birth weight less than 2.5 kg= 3
- No. Of babies with morbidity requiring NICU care and survived = 16
- Total no. Of dead babies=12
- No. Of babies with NICU care and died=1
- No. Of stillbirths = 11
-

Socio-demographic characteristics:

- No. Of cases in age group less than 19 yrs = 2
- No. Of cases in age group 20 -29 yrs = 39
- No. Of cases in age group 30 -40 yrs =9
- No. Of MNMM cases who were illiterate=5
- No. Of MNMM cases who had primary education=9
- No. Of MNMM cases who had secondary education=28
- No. Of MNMM cases who had higher secondary education=0
- No. Of MNMM cases who were graduates=8

- Most common adverse events associated with MNMM :

Hypertension=-26

Hemorrhage =21

Cardiac dysfunction =3

- Most common disorders associated with MNMM:

  Eclampsia n=16 (Antepartum=10,Postpartum=5,both=1)

  Severe pre eclampsia n=10 (severe=5;severe with signs/symptoms of Imminent eclampsia=5)

  Postpartum hemorrhage n=14

  Placenta previa/placenta accreta n=3

  Ruptured ectopic pregnancy n=4

  Congenital heart disease n = 1

  Rheumatic heart disease n= 1

  Cardiomyopathy n= 1

- No of cases which required surgical intervention to control hemorrhage = 20

  B lynch =2

  Bilateral uterine artery ligation= 6

Bilateral internal iliac artery ligation =4

Emergency hysterectomy = 8

- Other possibly contributing disorders in MNMM cases

Anemia =7

Diabetes mellitus = 2

Gdm = 1

Hypothyroidism = 1

- Major indications for transfer to HDU care :

Neurological dysfunction = 13

Circulatory collapse = 21

Need for intravenous antihypertensives = 3

Spo2 desaturation = 3

Anti failure measures =3

- Most common interventions in HDU;

  Ventilatory support = 7

  Transfusion of blood and blood products to correct circulatory collapse = 20

  Both the above = 4

  Anti failure measures = 3

  Intravenous antihypertensives = 3

- No/of pregnancy specific causes = 47
- No. Of Pre existing disorders aggravated during pregnancy =3
- No. Of pregnancy specific disorders =0
- No. Of incidental and accidental causes in pregnancy = 0

Reason for being classified as near miss:

- Cerebral dysfunction=20
- Hypovolemia necessitating >5 units of transfusion of blood &blood products=14

- Emergency hysterectomy =8
- Heart failure=3
- Pulmonary edema=2
- Impending hypovolemia which was avoided due to emergency surgical intervention =3

- **Near miss on arrival [n=33]**

Eclampsia n=12

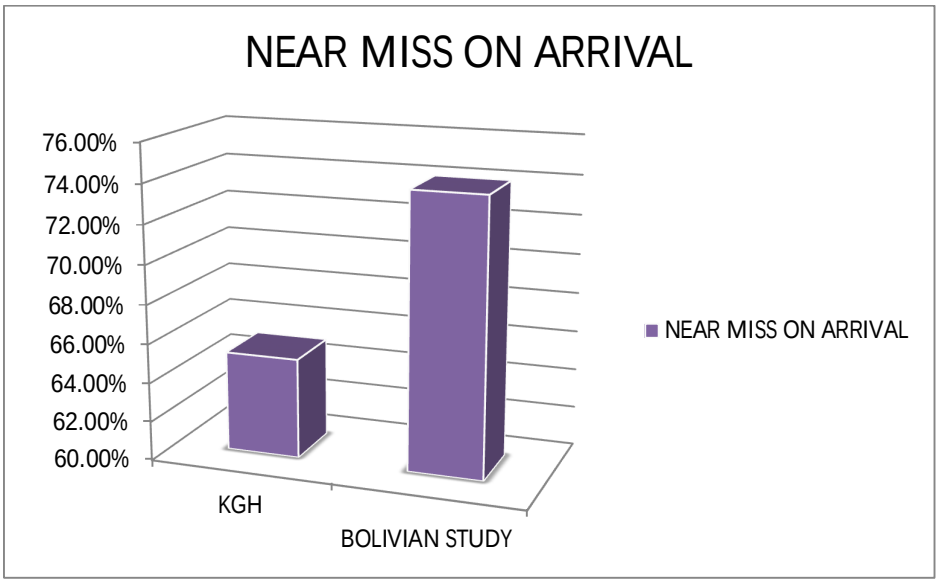
Imminent eclampsia n=4

Pulmonary edema due to severe pre eclampsia n=2

Abruptio placentae + couvelaire uterus n=2

Postpartum hemorrhage n=5

Rupture uterus n=1



Cardiac failure n=3

Ruptured ectopic pregnancy n=4

- **Near miss after admission n=17**

  <u>Had disorder on admission</u> and became near miss

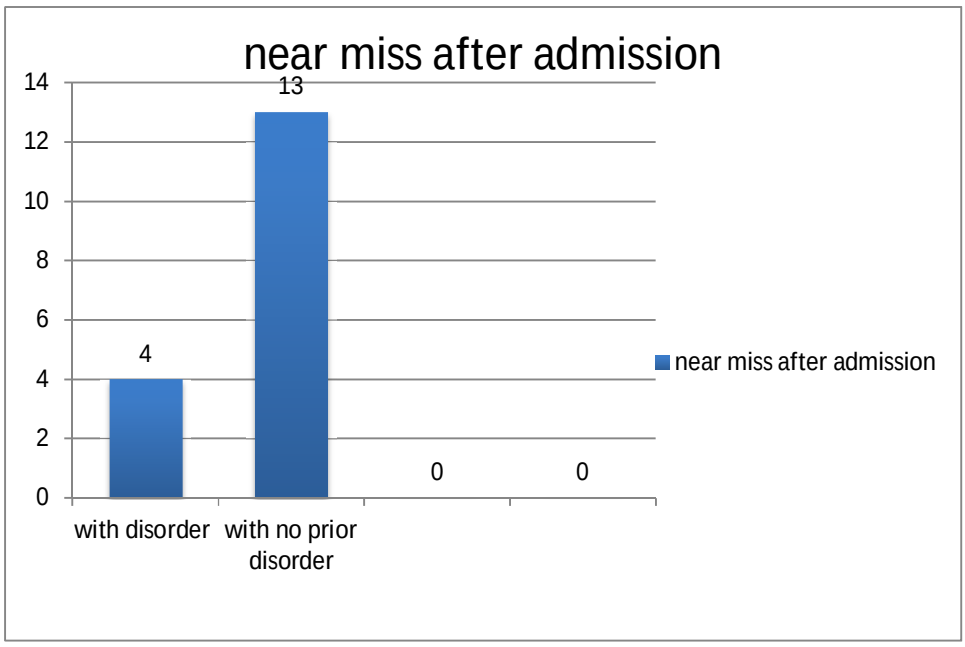
  n=4

  Severe pre eclampsia n=4

  Developed postpartum eclampsia n=2

Developed signs and symptoms of imminent eclampsia n=1

Developed DIC and PPH n=1



Had <u>no disorder on admission</u> but became near miss

n=13

Normal BP & urine albumin nil on admission but developed Postpartum eclampsia n=2

Repeat LSCS proceeded to emergeny cesarean hysterectomy = n=4

Admitted for repeat LSCS; relaparotomy done due to internal bleeding = 4% [n=2]

Admitted for repeat LSCS;required surgical procedures to control Hemorrhage n=1

Placenta previa /accreta proceeded to cesarean hysterectomy= n=5

- **Organ system which has failed:**

Hematological system=20

Central nervous system=11

Respiratory system=2

Cardiovascular system=3

Cns+ hematological system=10

Cns+ respiratory system=1

Respiratory+ hematological system=4

- MNMM with only one organ system involvement =36
- MNMM with more than one organ system involvement=14
- A minimum of 3 specialties were involved in the care of each patient.
- Average duration of hospital stay=mean 14.95 days(range 3 days 21 hrs to 44 days 8 hrs)
- Average duration of HDU stay=mean 94.18 hours(range 1 hour to 336 hours)
- No. Of cases referred from KGH to RGGGH = 3

For Neurological care -= 1

No.of cases referred for CCU care =2

- Most common investigations for which pt. Referred to RGGGH =

  CT BRAIN = 6

  MRI 1

  EEG 1

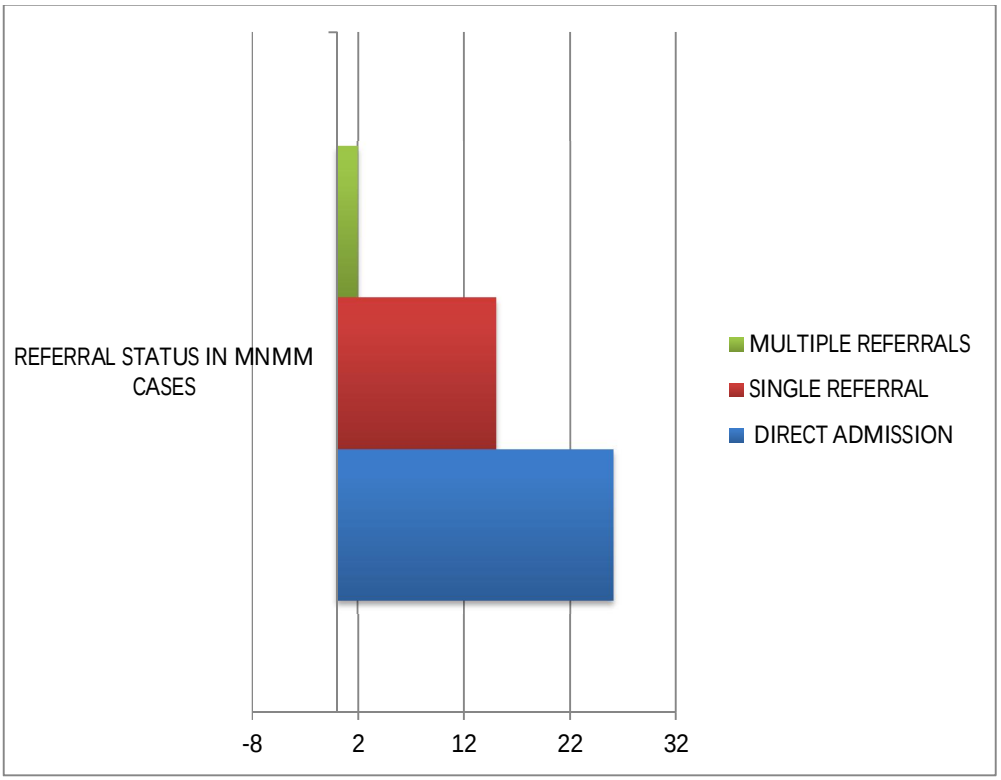
(2) The majority of cases 66% were near miss on arrival;

Of the 15 cases which became near miss after admission,4 had underlying preeclampsia which rapidly flared up- 2 developed postpartum eclampsia,one developed imminent signs with a persistently very high BP which necessitated i.v Nitroglycerine drip,and one went into DIC and atonic PPH.That all 4 survived reflects the quality of care in the hospital.

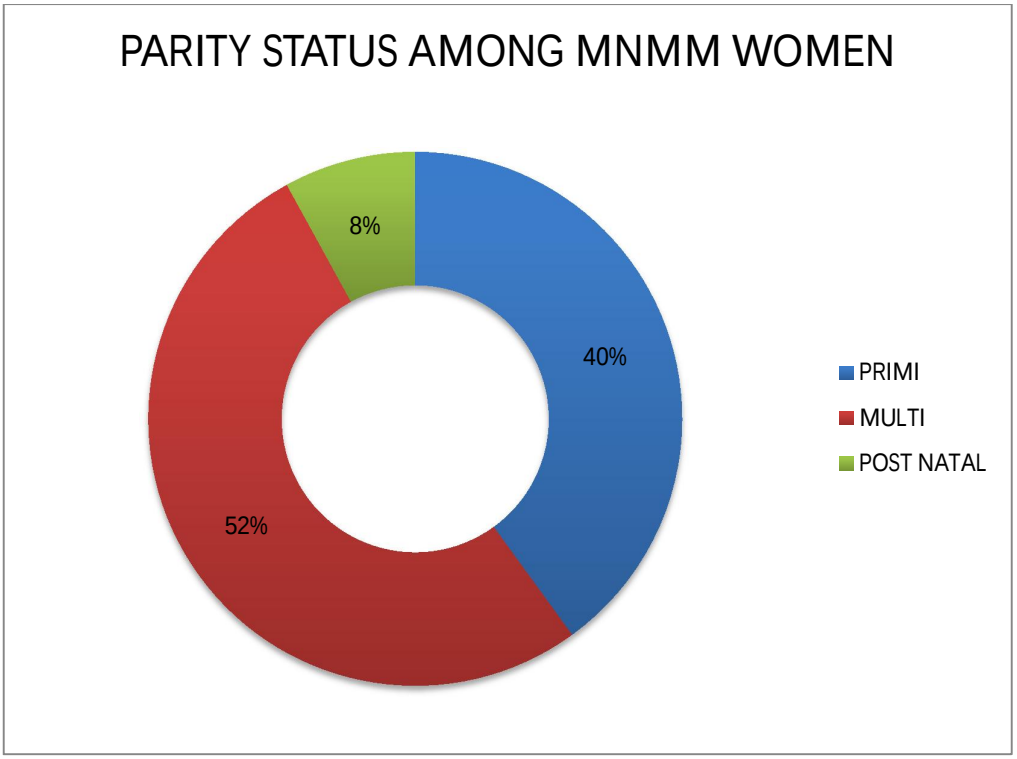
Among the remaining 13 cases which became near miss after admission,the most common cause was hemorrhage.5 of them had placenta Previa/accreta;5 had h/o previous LSCS which went in for atonic PPH ;all 10 necessitated emergency surgical procedures to PREVENT and manage hemorrhage. This probably reflects the knowledge and skill level of the care giving team and the supply of blood and blood products by the blood bank.

2 cases had normal BP and U/Alb on admission but subsequently developed eclampsia postpartum. This probably underscores the fact that normal BP readings may be deceptive ;it should not lull our watchful eyes into complacency. Effectively, MNMM after admission reflects the performance of obstetric services.

(3) The majority of cases 64% n=32 came directly to the hospital .32%[n=16] had one referral between health facilities;and 4.%[n=2]had two referrals between health facilities

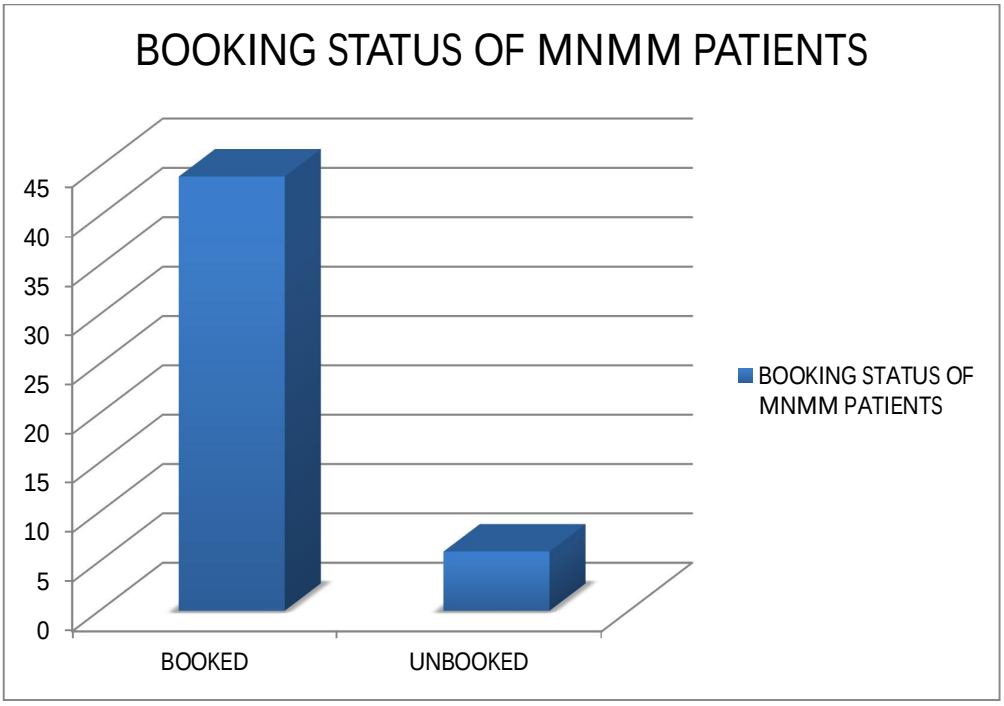


(4) Majority52%[n=26] of the MNMM were multigravida ;40%[n=20] were primigravida and 8% [n=4]were postnatal mothers.

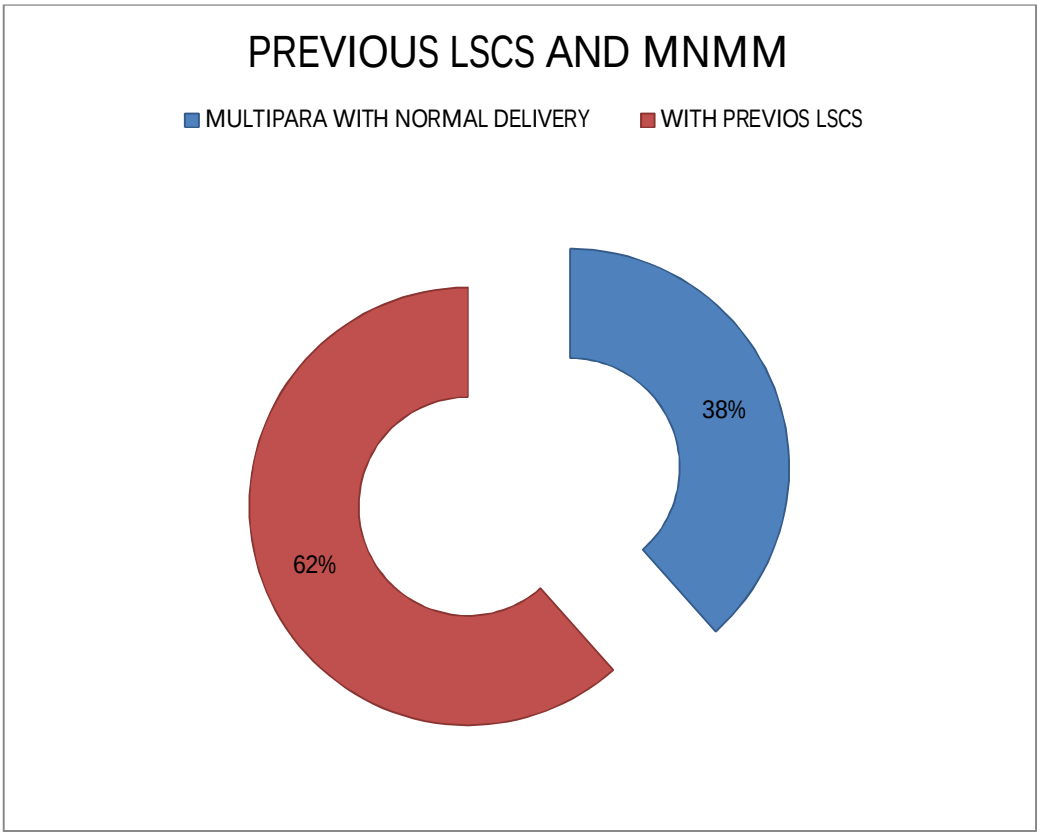


Of the 4 mothers who became MNMM postnatally, 3 were due to PPH and one was PP eclampsia

(5) 12%[n=6] of MNMM were unbooked and unimmunised; 4 of these were ectopic pregnancy where the women themselves were not aware of their pregnancy status;all the others were booked and immunised, either in Government[70%] or private[18%] hospitals. Probably even regular AN care may not pick up all the risk factors and prevent near misses.



(6) Among the multigravida with MNMM, only (n=10) had previous vaginal delivery.



The majority n= 16 had a previous caesarean section. Of this ,(n=12)had previous 1 LSCS and (n=4) had previous 2 LSCS

ASSOCIATION OF PREVIOUS LSCS AND MNMM

STUDY	**KGH**	**DUTCH STUDY**	**ALL BIRTHS NETHERLANDS STUDY**
Previous LSCS	32%	19.3%	6%

(7) Among the multigravida,the vast majority [n=24] had an interpregnancy interval more than 18 months.

n=2 had an interpregnancy interval less than 18 months.

(8) The majority76% [n=38]of MNMM cases presented in the third trimester ;

8% (n=4)presented in the IInd trimester-

3 were hypertensive disorders of pregnancy,

1 was abruptio placentae with couvelaire uterus.

One baby of a mother with hypertensive disorder of pregnancy survived ; all others were still born.

8%(n=4) of cases presented in the first trimester-all were ruptured ectopic pregnancy.

TRIMESTERWISE DISTRIBUTION OF MNMM PATIENTS

	% IN KGH	**%IN MANIPAL STUDY**
I TRIMESTER	8	12.9
II TRIMESTER	8	4.5
III TRIMESTER	76	57.2
POSTNATAL	8	27.3

(9) 12 cases belonged to CLASS III MNMM.

Of the 12,one baby was a preterm low birth weight (1.7kg) of a mother with AP eclampsia,who was admitted in NICU and died later due to sepsis.All the rest were still births.

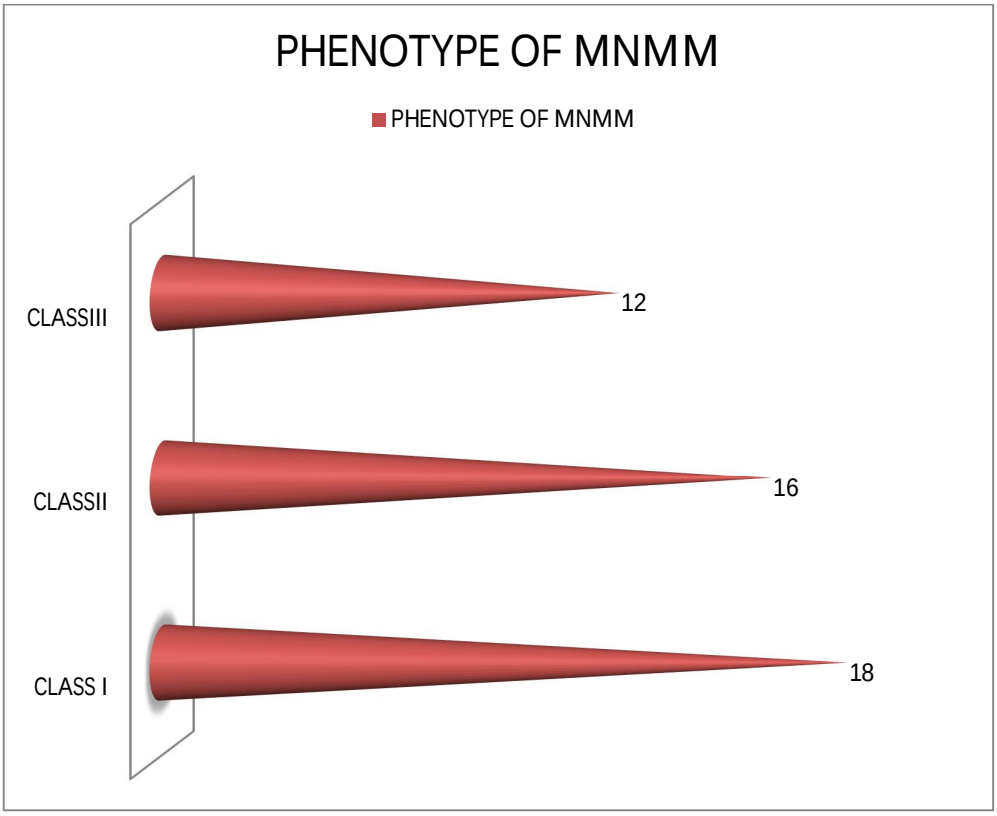
9 were due to hypertensive disorders of pregnancy(4 abruptio placentae;4 eclampsia;1 imminent eclampsia)2 were cases of placenta previa.

16 cases belonged to CLASS II MNMM.13 of these were infants of mothers with hypertensive disorders of pregnancy;2 were infants of mothers with heart disease;1 was infant of a mother who underwent Repeat LSCS -proceeded to hysterectomy due to post partum hemorrhage.

Of the term livebirths 3 had birth weight <2.5 kg; one was infant of a mother with RHD; one was infant of a mother with previous LSCS and placenta accreta; one was infant of a mother with anemia and previous 2 LSCS.

18 cases belonged to CLASS I MNMM;15 were term babies;3 were preterm babies;Both the preterms were infants of mothers with Hypertensive disorders of pregnancy.

Hypertensive disorders of pregnancy are a major cause of mortality and morbidity among infants.



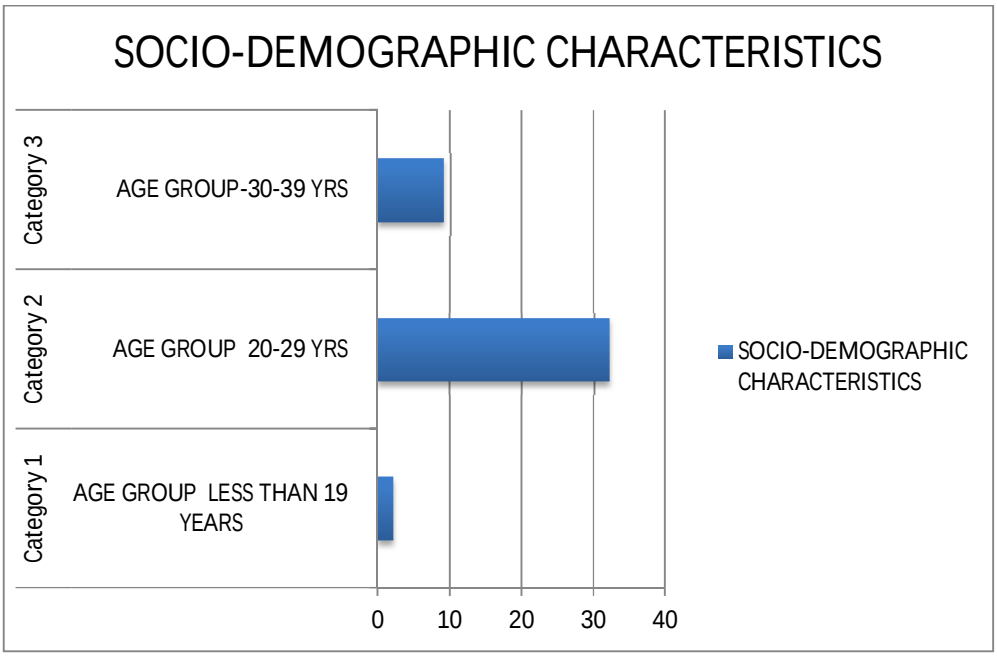
(10) Most ie,78%[n=39] of the MNMM cases were in the age group of 20-29 yrs;

18%(n=9) were in the age group of 30 - 40yrs;

4.%(n=2) were in the age group of <2oyrs;

There were only 6.%(n=3) over 35 years of age

The lowest age was 19 years



* The majority of MNMM 9o%(n=45) were educated.

10%(n=5) were illiterate.

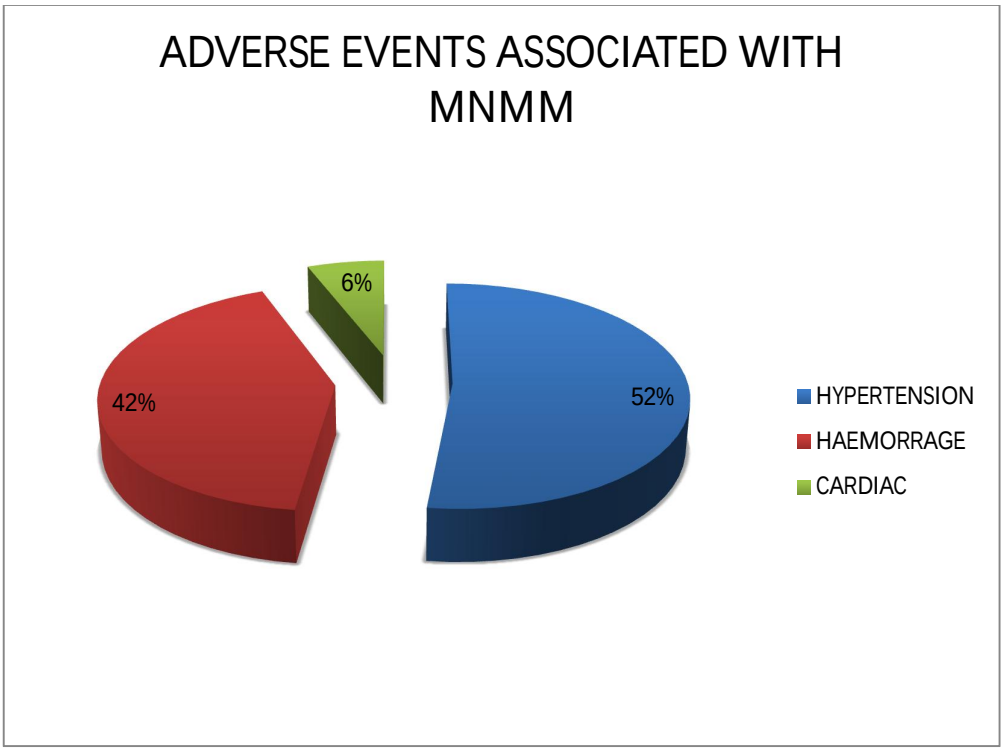
56%(n=28) were educated upto secondary level(upto class 10^{th})

16%(n=8) were graduates

18%(n=9) were educated upto primary level(upto class 7^{th})

* All the MNMM mothers were married; all were singleton pregnancies

* The most common adverse event associated with MNMM was hypertensive disorders of pregnancy(52%) followed by hemorrhage (42%) and cardiac dysfunction.(6%)



NO. OF MNMM WITH HYPERTENSIVE DISORDERS WITH h/ o PREECLAMPSIA IN PREVIOUS PREGANCY = 3(6%)

(14) The most common disorders associated with MNMM were :

ECLAMPSIA 32%

PPH 28%

SEVERE PREECLAMPSIA 20%

RUPTURED ECTOPIC PREGNANCY 8%

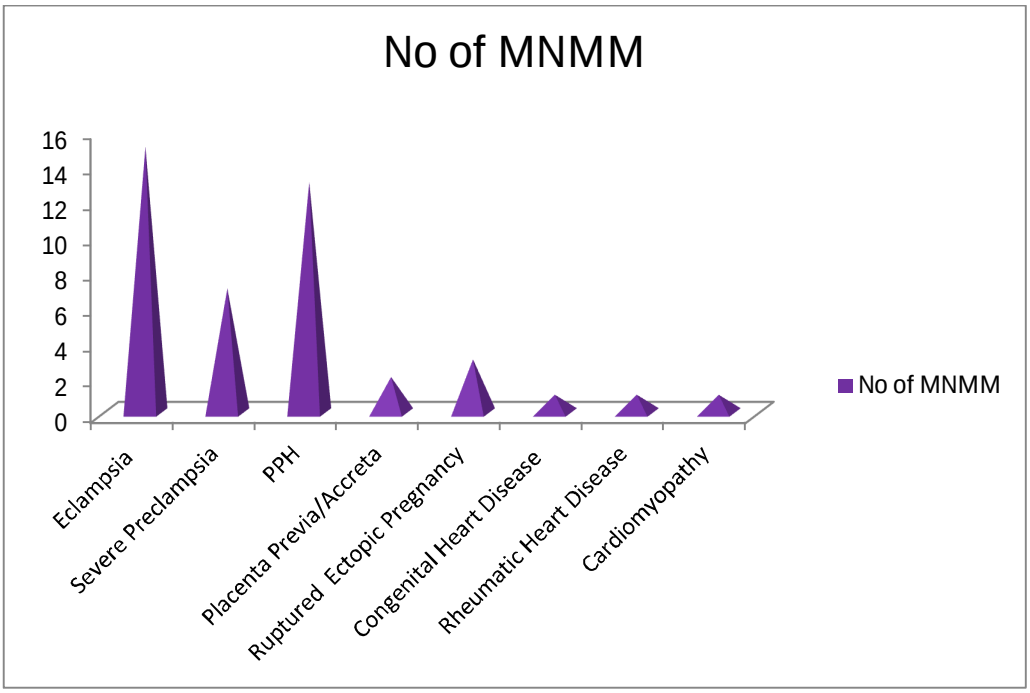
PLACENTA PREVIA /ACCRETA 6%

CONGENITAL HEART DISEASE 2.%

RHEUMATIC HEART DISEASE 2.%

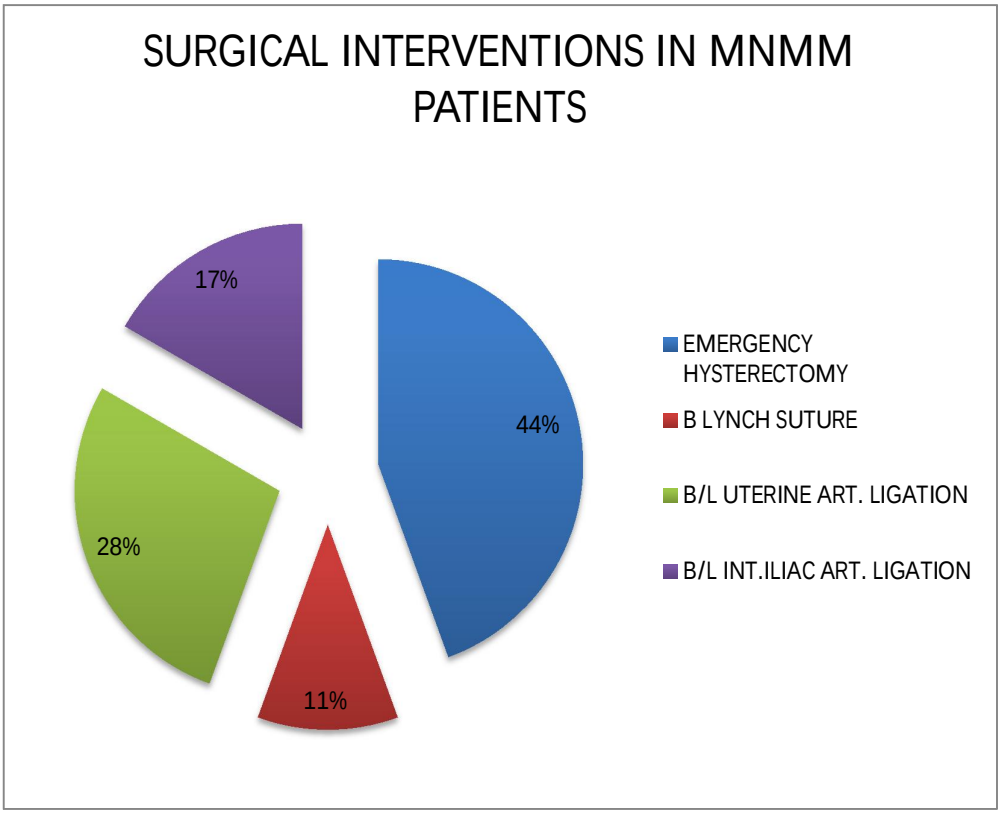
CARDIOMYOPATHY 2.%

DISORDER	FREQUENCYn (%)
ECLAMPSIA	16(32%)
SEVERE PRE ECLAMPSIA	10(20%)
POSTPARTUM HAEMORRHAGE	14 (28%)
PLACENTA PRAEVIA	3(6%)
RUPTURED ECTOPIC	4(8%)
CONGENITAL HEART DISEASE	1(2%)
RHEUMATIC HEART DISEASE	1(2.%)
CARDIOMYOPATHY	1(2.%)

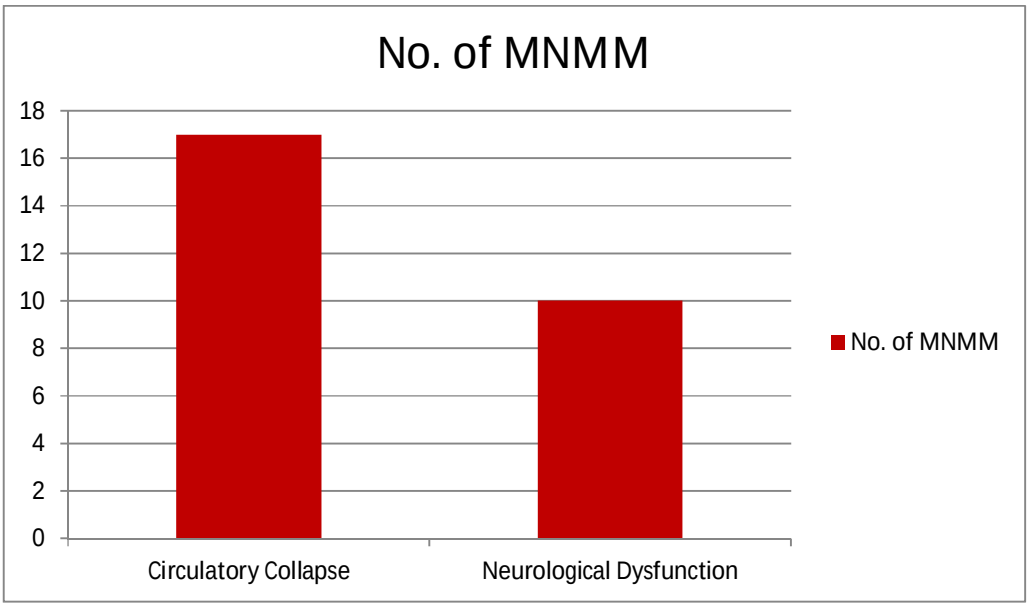


Though the most common causes of MNMM were hypertensive disorders of pregnancy and hemorrhage, there was low mortality for both these conditions. This implies that treatment for both these conditions was effective in the hospital..

(15) Life saving Surgical interventions to control hemorrhage were required in 20 cases; step wise devascularisation was done. B LYNCH suturing(n=2),bilateral uterine artery ligtion(n=6), bilateral internal iliac artery ligation(n=4)emergency hysterectomy(n=8).



- 7 CASES had anemia;2 were DM on insulin;1 was GDM on insulin;1 was hypothyroid on treatment. These could have contributed to the maternal morbidity.
- All but 4 cases[severe preeclampsia with imminent signs-1,atonic PPH -3] were shifted to HDU and managed. The major indications for transfer to HDU were cerebral dysfunction (convulsions) and circulatory collapse needing massive transfusion.



The most common indications for HDU care were: CIRCULATORY COLLAPSE = 42%

NEUROLOGICAL DYSFUNCTION = 26%

NEED FOR INTRAVENOUS ANTIHYPERTENSIVES = 6% sPO2 DESATURATION = 6%

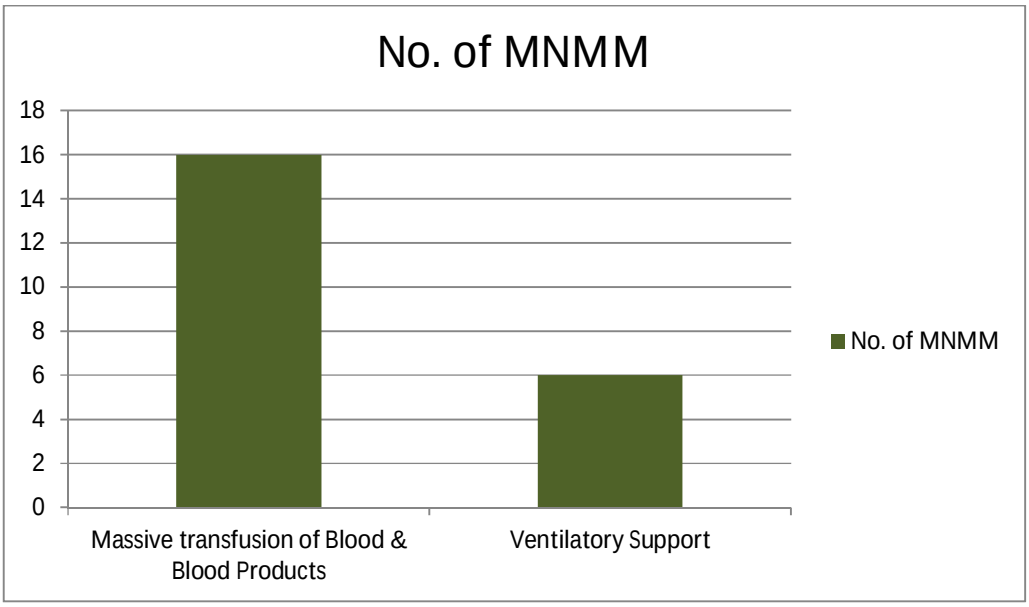
FOR ANTI FAILURE MEASURES = 6%

- MOST COMMON INTERVENTIONS IN HDU: TRANSFUSION OF BLOOD AND BLOOD PRODUCTS TO CORRECT CIRCULATORY COLLAPSE = 40%

  VENTILATORY SUPPORT = 14%

  BOTH THE ABOVE = 8%

  ANTI FAILURE MEASURES = 6%



INTRAVENOUS ANTIHYPERTENSIVES = 6%

The most common intervention in HDU, apart from transfusion of blood and blood products, was ventilatory support. Eclampsia drills and training sessions in intubation skills need to be conducted on a regular basis.

- 94% (n=47) were pregnancy specific causes;6.%(n=3) were pregnancy aggravated causes;14% of MNMM with preeclampsia had h/o high BP in previous pregnancy. Early detection of preeclampsia would go a long way in preventing these near miss cases.

NO. OF PREGNANCY SPECIFIC CAUSES	47
NO. OF PRE EXISTING DISORDERS AGGRAVATED DURING PREGNANCY	3
NO. OF PREGNANCY SPECIFIC DISORDERS	0
NO. OF INCIDENTAL AND ACCIDENTAL CAUSES IN PREGNANCY	0

- **REASON FOR BEING CLASSIFIED AS NEAR MISS:**

CEREBRAL DYSFUNCTION=40%

HYPOVOLEMIA NECESSITATING >5 UNITS OF TRANSFUSION OF BLOOD & BLOOD PRODUCTS=28%

EMERGENCY HYSTERECTOMY FOR ANY REASON=16%

HEART FAILURE=6%

PULMONARY EDEMA= 4%

IMPENDING HYPOVOLEMIA WHICH WAS AVOIDED DUE TO EMERGENCY SURGICAL INTERVENTION = 6%

REASON	MNMM n (%)
Cerebral dysfunction	20(40%)
Hypovolemia necessitating >5 units of transfusion	14(28%)
Emergency hysterectomy	8(16%)
Heart failure	3(6%)
Pulmonary edema	2(4%)
Impending Hypovolemia ,avoided due to emergency surgical intervention	3(6%)

- A minimum of 3 specialties [maximum of 7] were involved in the care of these patients in HDU. That Specialty opinions were sought from the departments of Internal Medicine, General Surgery, Medical gastroenterology, Anesthesia, Ophthalmology, ENT, Chest medicine, Cardiology, Neurology, Radiology &

Nephrology in the management of MNMM reveals the complexity of these cases. In the Canadian study (7) 20 different specialties were involved in the care of MNMM patients.

- On an average, these patients required 14.95 days of hospital stay and 94.18 hours of care in High Dependency Unit setting.

- 72%(n=36) of cases had one organ system involvement while 28%(n=14) had more than one organ system involvement. Since HDU is a place for intensive care when one organ system is involved and ICU is the place for intensive care when more than 1 organ system is involved, probably upgrading the HDU to ICU may be considered to give better care to these rare but very ill patients.

- Since KGH is predominantly a specialty hospital for Obstetrics & Gynecology, cases requiring superspecialty care like cardiology or neurology were transferred to RGGGH (2 cases – one with RHD and the other with OS ASD operated were transferred to CORONARY CARE UNIT after obstetric intervention was completed)

Speciality to which transfer of MNMM cases occurred	**No. of cases**
CORONARY CARE UNIT	2
NEUROLOGY	1

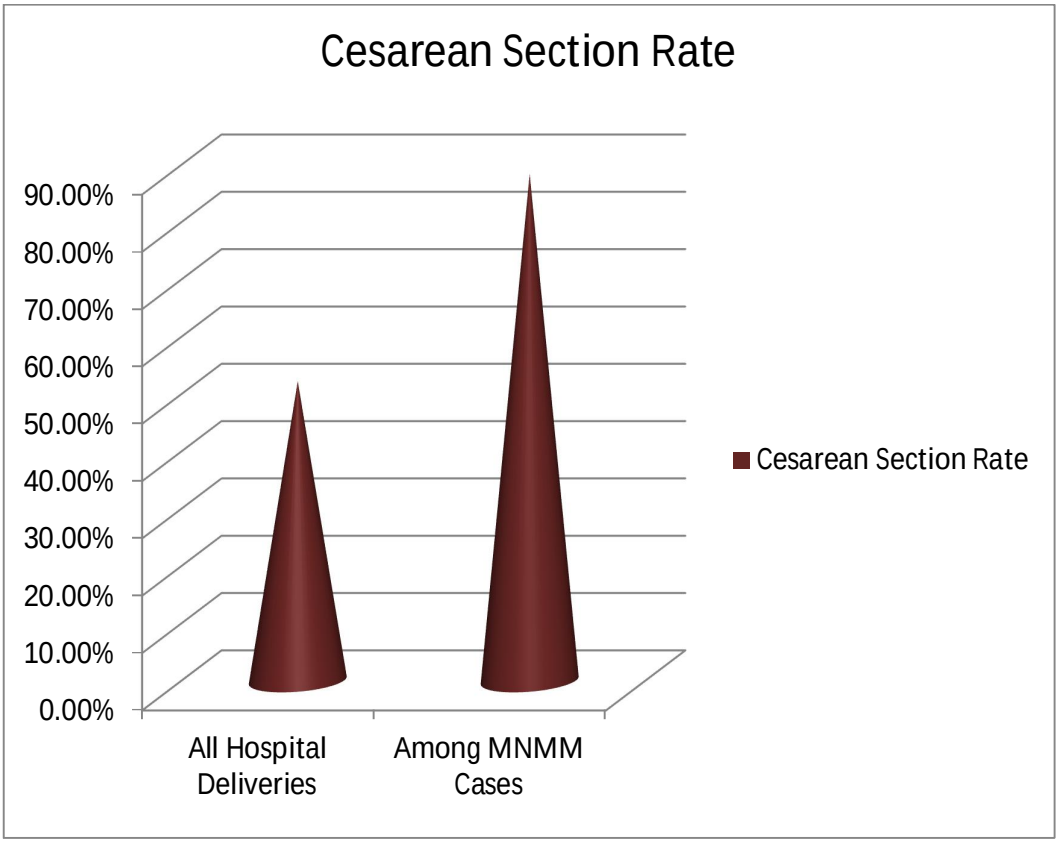
- A case of Eclampsia who developed Posterior Reversible Encephalopathy Syndrome in the postpartum period was transferred for expert neurology care.

- All 3 patients survived.

- The most common investigations for which patients were referred to RGGGH were CT SCAN,MRI & EEG. Probably availability of these investigations inside the hospital campus may further improve the quality of care.

Investigation for which transfer of MNMM cases occurred	**No. of cases**
CT SCAN	3
MAGNETIC RESONANCE IMAGING	1
ELECTRO ENCEPHALOGRAM	1

- During the Study Period, The Cesarean Section Rate In KGH was 52.52% Of All Hospital Deliveries. The Cesarean Section Rate Among Near Miss Women Delivering At KGH Was 88.%



- Anemia & Previous caesarean section seem to be risk factors for MNMM. Of the 21 women who had life threatening hemorrrhage, 16 had h/o previous LSCS;7 had anemia. Both cases of Rupture Uterus and all 3 cases of Placenta previa/accreta had h/o previous LSCS. Perhaps a more restrained approach to primary caesarean section will prevent MNMM due to hemorrhage.

The Blood Bank in KGH is a WHOLE BLOOD storing unit; Still, apart from 163 UNITS OF WHOLE BLOOD / PACKED CELLS (mean3.7units) it has issued 107 UNITS OF FRESH FROZEN PLASMA(mean 2.4units) AND 31 UNITS OF PLATELETS (mean 0.72units)

through its tie-ups with other hospitals during the care of these patients.

BLOOD COMPONENT USED	**No. of Units**
WHOLE BLOOD / PACKED CELLS	163
FRESH FROZEN PLASMA	107
PLATELETS	31

DISCUSSION

- The majority of cases 66% in KGH were near miss on arrival;This same pattern- 74% near miss on arrival- was observed in the Bolivian study[3]

This may be attributed to failure of recognition of the seriousness of the condition [as in the case with c/o pain lower abdomen who was treated in a private hospital for gastritis and sent home; she landed up 4 hrs later in KGH as near miss with ruptured ectopic pregnancy]or delayed decision to seek medical assistance [as in the case of a home delivery with PPH]

Addressing this 'first delay' needs research to understand the health seeking behaviour of the women and regular updating of knowledge and skills among the medical fraternity. However, MNMM on arrival also reflects the effectiveness of emergency referrals.

- The MNMM INCIDENCE RATIO ranged from 3.8 to 12 per 1000 livebirths in developed countries(5);In the MANIPAL study in INDIA(4) it was 17.8 /1000 live births. In the KGH study, it was 0.89/1000 live births. This is comparable to the incidence in high income countries where it is between 0.5 and 1%(5)(10)

Study	**KGH**	**Manipal Study**	**High Income Countries**
MNMM Incidence Ratio	0.89	17.8	0.5

- THE MNM:MORTALITY RATIO in Western Europe was 117-223 : 1. It was 5.6:1 in the Manipal study and16.6:1 in the KGH study

Study	**KGH**	**Western Europe**	**Manipal**
MNMM : Mortality Ratio	16.6 : 1	117-223 : 1	5.6 : 1

- MODE OF DELIVERY in the index pregnancy in MNMM by caesarean section was 43.6% in the Dutch survey (5) and 13% in the Netherlands study(5) ;63% in the Bolivian study(3);it was 88% in the KGH study. (27)

Study	**Dutch Survey**	**Bolivian Study**	**KGH Study**	**All Births Netherlands Study**
Delivery by Caesarean in MNMM	43.6%	63%	88%	13%

- During the study period, the cesarean section rate in KGH was 52.52% of all hospital deliveries. The cesarean section rate among

NEAR MISS women delivering at KGH WAS 88%.In the Bolivian study, the caesarean section rate among hospital deliveries was 28%;in MNMM cases it was 63%.In the Canadian study ,about 50% of MNMM patients required CESAREAN SECTION

- MODE OF DELIVERY WAS ASSISTED VAGINAL DELIVERY in 12.7% in the the Dutch study(5) and 8.6% in the Netherlands study(5) ;it was 4% in the KGH

- HOME DELIVERY complicated by MNMM was 6.3% in the Dutch study(5) and 31.6% in the Netherlands study(5) and 9.5% in the Bolivian study ;it was 4% in the KGH study. Probably this reflects the institutionalisation of births in India which favours the early identification and management of peripartum complications.

Study	Dutch Survey	Bolivian Study	KGH Study	All Births Netherlands Study
Home Delivery	6.3%	9.5%	4%	31.6%

- RISK FACTORS OF MNMM: Being older than 35 years, not having a partner, being a primipara or para > 3, and having had a Caesarean section in the previous pregnancy were factors independently associated with the occurrence of severe maternal morbidity. (11)

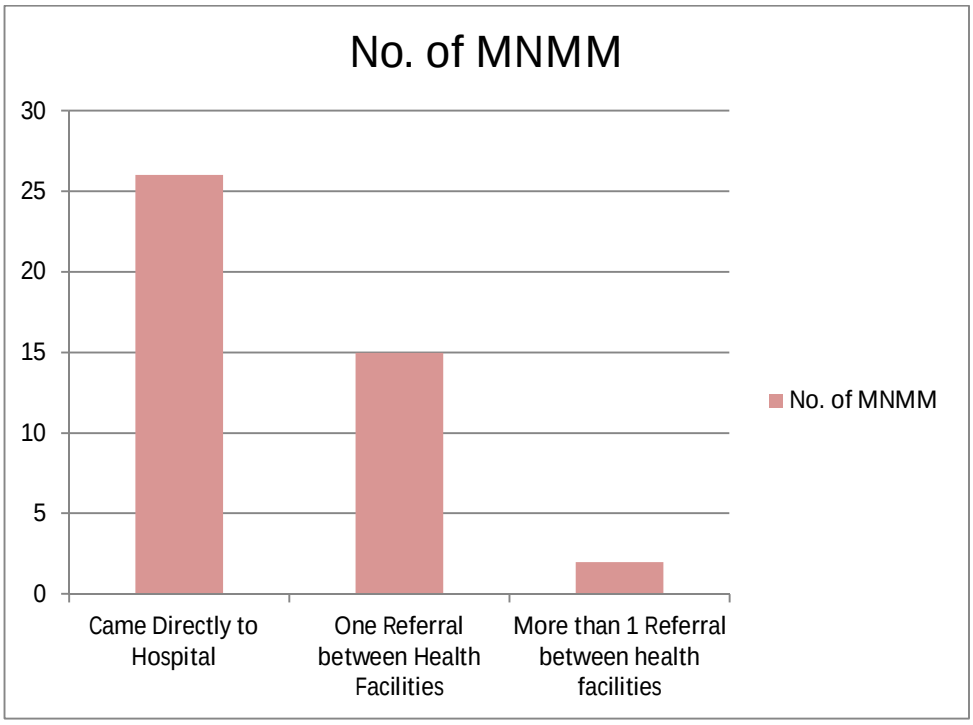
AGE >35 was a significant risk factor in both the dutch [29.3%] and the Netherlands study[24.7%].(5)It was not significant in the KGH study [6%]probably because of the early age of marriage and social pressure not to postpone childbirth in India.

PREVIOUS LSCS: In the Dutch study,19.3% of MNMM had a h/o previous Cesarean section; In the Netherlands study,6% had h/o prior caesarean section;In the KGH study,32% of MNMM had h/o previous Cesarean section

In the Dutch study, primiparity, diabetes, hypertension and prior caesarean section were identified as risk factors for developing MNMM. In the KGH study, multiparity, anemia ,diabetes and previous caesarean section seem to be risk factors for developing MNMM. In the Abbotabad study (8)anemia 37% and diabetes 10% were identified as risk factors.

REFERRAL PATTERNS IN MNMM

In the KGH study, the majority of cases 64% came directly to the hospital 32% had one referral between health facilities; and 4% had two referrals between health facilities. This pattern of health seeking behaviour is comparable to the pattern in the BOLIVIAN study (3) where the majority58% of cases came directly to the hospital, 36%had one referral between health facilities and 6%had two referrals between health facilities.



- Distribution of MNMM in early and late pregnancy:

In the Bolivian study,26% of MNMM presented in early pregnancy. Most of them were related to pregnancy termination-which is a sensitive, legally restricted issue in Bolivia. In the KGH study only 16% of MNMM presented in early pregnancy(<28 wks).They were due to hypertensive disorders of pregnancy(in IInd trimester) and ruptured ectopic pregnancy (in Ist trimester). Probably because of the MTP act and legalisation of abortion in India, there were no MNMM attributable to pregnancy termination in the KGH study.

MNMM	KGH STUDY	BOLIVIAN STUDY
Most common cause in early pregnancy	Hypertension disorders of pregnancy	Hemorrhage
Percentage of MNMM in early pregnancy	16%	26%

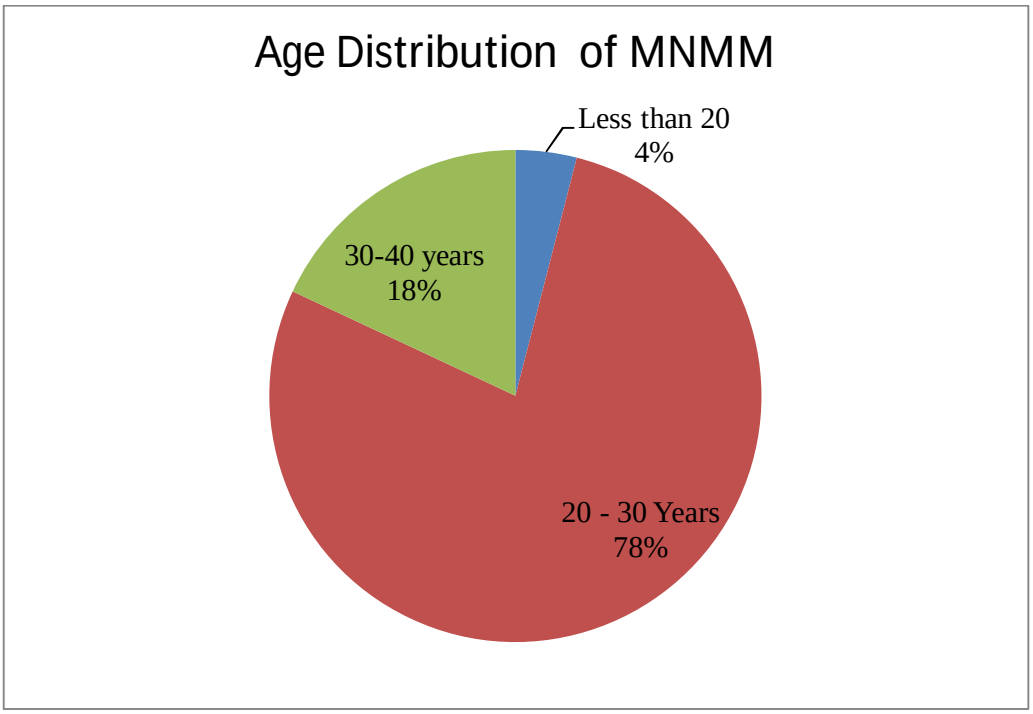
In the KGH study, majority 76% of MNMM were in late pregnancy (> 28 weeks). This pattern is similar to the Manipal study(4) where 57.2% of MNMM presented in late pregnancy.

The proportion of MNMM who presented in the postnatal period was higher (27.3%) in the Manipal study(4) than in the KGH study where it was only 8%(n=4).The most common cause(n=3) of MNMM in the postnatal period in the KGH study was PPH ; the other cause (n=1)was Postpartum eclampsia following a preterm home delivery.

- In the Bolivian study, sepsis(1.4/1000) and obstructed (0.4/1000)labour were uncommon causes of MNMM. These causes are not to be found in the KGH study, probably due to the widespread use of partographs in monitoring labour.

- SOCIO DEMOGRAPHIC CHARACTERISTICS: In the KGH study, most of the MNMM cases 78% were in the age group of 20-30 yrs; there was no one younger than 19 yrs; 6% were aged> 35 yrs.

- In the Bolivian study mean age was 28 yrs(SD=7.1).In the Manipal study, the mean age was 27.0+/-4.7. All over the world a vast majority of women in the prime of youth are exposing themselves to the risk of pregnancy and its attendant morbidities.



- In the KGH study,majority of MNMM patients 90%(n=45) were educated.

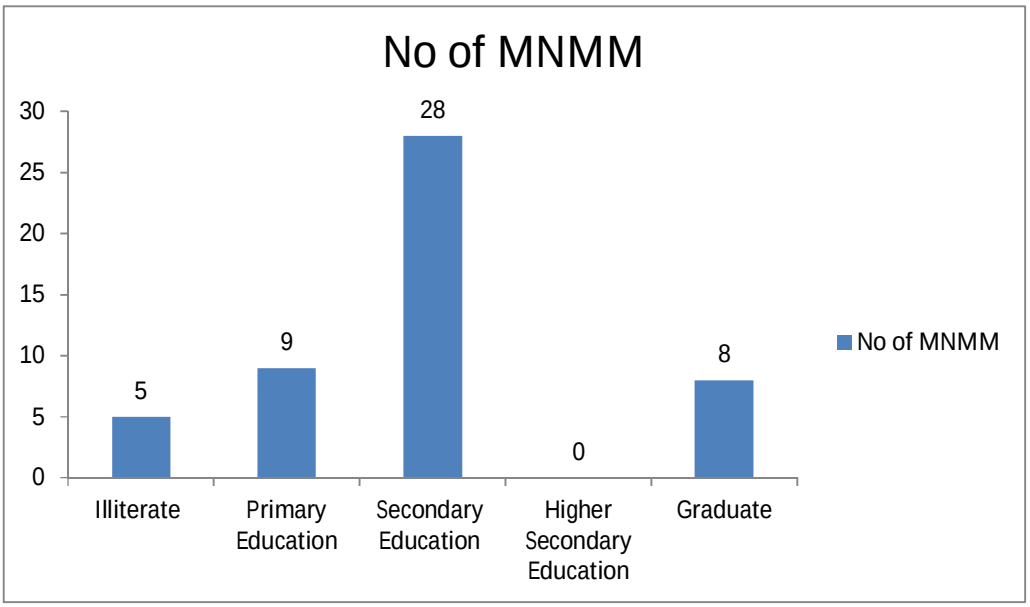
10%(n=5) were illiterate.

56%(n=28) were educated upto secondary level(upto class 10^{th})

16%(n=8) were graduates

18%(n=9) were educated upto primary level(upto class 7th).

This pattern is similar to the Bolivian study where 3.5% were illiterate,38% had primary education,44.5% had secondary education and 14% had higher education.



PRIMARY - UPTO CLASS 7TH

SECONDARY - UPTO 10TH

- IN the KGH study,52% of MNMM were multigravida(26) while 34% were primigavida(n=17)This pattern reflects the Bolivian study where 56% were multipara but differs from the Dutch study where the higher occurrence of nulliparity seems to be a risk factor for developing MNMM.

- In the KGH study,[n=6] of MNMM were unbooked and unimmunised;4 of these were ectopic pregnancy and the women were not aware of their pregnancy; only n=2 antenatal mothers were unbooked; all the others were booked and immunised, either in Government or private hospitals. This is in contrast to the Kathmandu study where 75% of cases were unbooked in the hospital .In the Abbotabad study,96% of the mothers were unbooked(8).

Study	**KGH Study**	**Kathmandu Study**	**Abbottabad Study**
No. of Unbooked MNMM	4.%	75%	96%

- In the Bolivian study(3) 88% of MNMM were either married or cohabiting while 12% were single . All MNMM were married in the KGH study; This probably reflects the universality of marriage in this part of the world.

- **ANALYSIS OF THE CAUSES OF MNMM(adverse events)**

In the Netherlands, the most frequent cause of MNMM (5)was Major Obstetric Hemorrhage(4.5 per 1000 births) while the most frequent cause of maternal deaths was (pre-)eclampsia.

In Pretoria, Obstetric hemorrhage, Hypertension and sepsis account for 26%,26% and 20% of MNMM(6)

In the Manipal study, obstetric Hemorrhage 44.2%,Hypertensive disorders 23.6%,sepsis 16.3%,cardiac 4.5% were the most common causes.

In the Abbottabad study(8),the most frequent cause was Hypertension 50%,sepsis 17% and Hemorrhage 13%.

In the KGH study, Hypertensive disorders of pregnancy(52%) , Major obstetric Hemorrhage(42%) and Cardiac causes (6%) were the common causes.

The incidence of obstetric hemorrhage in KGH was 3.77 per 1000 live births which is comparable to the Netherlands National study(5)

- ANALYSIS OF THE CAUSES OF MNMM-is there any difference between MNMM on arrival and MNMM after admission?

In the KGH study,34.% became near miss after admission to hospital. The most common adverse event in this group of patients was Hemorrhage.

In the KGH study,66% were near miss at the time of arrival; majority of them had Hypertensive disorders of pregnancy as the adverse event.

This pattern is also reflected in the Bolivian study where 59% of near miss on arrival were due to Hypertensive disorders of pregnancy and 85% of near miss after admission were due to Hemorrhage.

- **ORGAN SYSTEM DYSFUNCTION**

In the Pretoria study(6), the most common organ system dysfunction was vascular dysfunction(hypovolemia) 37%;the same was true of the Kathmandu study;

Study	**KGH**	**Pretoria Study**	**Kathmandu Study**
Most Common Organ System Dysfunction	Hematological System	Vascular Dysfunction	Vascular Dysfunction

In the KGH study also, the most common organ system dysfunction was the haematological system(both vascular and coagulation system were included under the same head)

Obstetric hemorrhage, though not an important cause of maternal mortality, is still a main cause of MNMM .Preventive measures, protocols and resources for the management of APH and PPH and Skill training in management of obstetric emergencies on a regular basis is important to keep this ground won

A strategy to provide access to good **quality and up-to-date information to the entire team should be in place**.**Obstetric haemorrhage is not an important cause of maternal mortality, but is still present as a major cause of severe maternal morbidity.**

Preventive measures, protocols and resources for the management of ante or postpartum haemorrhage must not only be maintained, but improved, despite the fact that haemorrhage is not a major cause of mortality

- More than 1 organ system was involved in 28% of MNMM patients in the KGH study ; this was similar to the Kathmandu study where 26.92% had more than 1 organ system involvement

- The MNMM cases required hospital care for 13 days [mean 13 days ; range 3 to 92 days] in the study by Baskett et al.

In the KGH study, the MNMM cases required hospital care for a mean of 14.9 days[range 3 days 21 hours to 44 days 8 hours]

- HDU care was required for a mean of 94.18 hrs[range 1 hour to 336 hours]
- 53% of MNMM required blood and blood products; of these 26 received red cells[mean=8 units];4 cryoprecipitate[mean 10 units]12 albumin[mean 4 units]15 platelets [mean=14 units]14 fresh frozen plasma[mean 8 units].In the KGH study, apart from 163 UNITS OF WHOLE BLOOD / PACKED CELLS(mean3.7units) 107 UNITS OF FRESH FROZEN PLASMA (mean 2.4units) AND 31 UNITS OF PLATELETS (mean 0.72units) have been used during the care of these MNMM patients.

- Numerically, haemodynamic compromise was the most common system dysfunction.

The limitation of the study is that it is done over a relatively short period; when done over a span of years it can be useful to assess the efficacy of improvement measures implemented and the long term effects of MNMM.

SUMMARY AND CONCLUSIONS

- The MNMM INCIDENCE RATIO in this study is 0.8 per 1000 live births.This is comparable to High income developed countries where it is between 0.6 and 1%.

- Hypertensive disorders and Hemorrhage and are the leading causes of near miss situations .

- Previous LSCS and Anaemia seem to be risk factors for developing MNMM.

- The Mortality Index is low;at 0.05,it reflects good quality of care

- The causes of Near Miss reflect the causes of maternal death. Near miss analysis is worth presenting in national indices as a surrogate for maternal death.

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Definition and Criteria for Maternal Near Miss

Definition:

"A woman who survives severe life threatening conditions, either after receiving emergency medical/surgical interventions or otherwise; during pregnancy, abortion, child birth or 1ithin 42 days of pregnancy termination" is called as Maternal Near Miss.

1. Overall this definition of Near Miss is based upon the patient's obvious life threatening condition; however we need to know which disorderslead to which adverse events, which finally cause Near Miss situation. The conditions known to cause Near Miss are –

   1.1 Pregnancy Specific Disorders such as Abortions, Ectopic Pregnancy, Gestational Trophoblastic Disease, Antepartum Haemorrhage (Placenta Previa and Placental Abruption), Severe Preeclampsia, Eclampsia and HELLP syndrome, Prolonged Rupture of Membranes with Chorioamnionitis, Third Stage complications (inversion of Uterus, Retained Placenta, Cervical Vaginal Tear). Complications of Induced labour of Caesarean Section, Rupture Uterus, Scar Dehiscence, Amniotic Fluid Embolism, Postpartum Haemorrhage, Postpartum shock, Puerperal Sepsis etc.

   Abortions, Placenta praevia and Atonic PPH lead to vaginal bleeding whereas Rupture Uterus, Ectopic Pregnancy and Invasive mole might lead to intra peritoneal bleeding and there may not be any vaginal bleeding. Amount of bleeding leading to circulatory collapse should be considered as Near Miss. This might differ according to pre-existing haemoglobin status and or the rapidity with which blood loss occurs.

Woman with Septic shock with hyperpyrexia, tachycardia, tachypnoea, evidence of pus in viscera or intraperitoneally, injury to bladder/ bowel, requiring resuscitative procedure should be considered as Near Miss.

Hypertensive disorders complicated by Hepatic, Renal, Cardiovascular failure, Cerebral Hemorrhage, Unconsciousness, Coma, Disseminated Intravascular Coagulation indicate Near Miss.

1.2. Preexisting Disorders Aggravated During Pregnancy such as Anaemia, Sickle cell Disease, Thalassemia, Leukemia, Thrombophilla, Respiratory Disorders Tuberculosis, Cardiac Disorders (Rheumatic Heart Disease, Congenital Heart Disease, Cardiomyopathies, Aortic Aneurysm), Renal disorders (Medico-Renal Disease and Renal Artery Stenosis), Hepatic Disorders (Portal hypertension with Cirrhosis), Endocrinal Disorders (Diabetes mellitus, Thyrotoxicosis and Pheochromocytoma), AIDS etc.

Liver Disorders with deep Jaundice associated with altered consciousness, flaps, tremors and bleeding from abnormal sites are Near Miss.

Cardiac disorders requiring cardio respiratory support are Near Miss.

Anaemia with cardio respiratory collapse or patient not maintaining oxygen saturation and requiring cardio respiratory support is Near Miss.

Respiratory disorders requiring mechanical support and intubation indicate Near Miss.

Carbohydrate Metabolism disorders with Loss of Consciousness, Coma, Electrolyte Imbalance indicate Near Miss.

Thyroid excess disorder/ Pheochromocytoma which need cardio respiratory support indicate Near Miss.

Altered consciousness, Neurological damage in any of these conditions indicates Near Miss.

Pregnant women are not immune to any Medical / Surgical disorders.

1.2 Pregnancy Specific Medical Disorders (Medical disorders peculiar to pregnancy) such as Cardiomyopathy and Acute fatty liver of pregnancy. Near Miss situation is similar as in the category of Medical Disorders with pregnancy.

1.3 Incidental and Accidental causes in Pregnancy such as infections such as Hepatitis (A, HIV/AIDS, Pneumonia, ARDS, Pulmonary embolism, Myocardial infarction, Stroke, Cancers, Anaphylaxis to drugs, Surgical emergencies, Burns, Poisoning, Trauma due to Accident or violence, Assault etc.

Woman with trauma/accident presenting with circulatory collapse indicates Near Miss. Woman with Anaphylaxis following administration of a drug followed by cardio respiratory failure indicates Near Miss.

Infections with altered consciousness indicate Near Miss and Embolism with cardio respiratory failure indicates Near Miss.

2. Many women suffer due to pregnancy/birth related disorders or other conditions but all do not become Near Miss, so there is a need to know what the adverse events are and what the severity of these events is, which make the woman Near Miss. The adverse events which need to be included for comprehensive criteria for Near Miss are those which are known globally, where prevention may or may not be possible and are known to lead to Maternal Mortality. Thus the comprehensive criteria need to be made on the basis of major responsible etiological factors.

Thus in a seriously ill patient, the clinical symptoms, signs added by investigate profile and interventions determine whether the woman is suffering from a severe life threatening condition or not, so clinical criteria become extremely important at any level of facility to diagnose the case as Near Miss.

For each disorder a battery of investigations is needed, however which is possible, depends on the level of facility in which the woman is treated. Separate Intensive Care units are not available at every health facility; however Near Miss woman needs intensive care, sometimes cardio respiratory support and mechanical ventilation also. She may need use of cardiotonics and massive blood / components transfusion wherever available. As a life saving measure she may need surgical procedures such as obstetric hysterectomy, internal iliac ligation etc.

For the comprehensive criteria of Near Miss it is essential to know possible disorders and adverse events which lead to Near Miss. (Annexure –I)

ABBREVIATIONS

AN-----Ante Natal

ECl------Eclampsia

HDU----High Dependency Unit

ICU---Intensive Care Unit

LSCS----Lower Segment Caesarean Section

MD ----Maternal Death -

MMC ---- Madras Medical College, chennai

MMR—Maternal Mortality Rate

MNMM--- Maternal Near Miss Morbidity

NICU-----Neonatal Intensive Care Unit

PPH---Post partum Haemorrhage

RGGGH—Rajiv Gandhi Governent General Hospital,chennai

SNB -----Sick New Born

TFR---Total Fertility Rate

ANNEXURE – 1

Comprehensive Criteria for Maternal Near Miss

1.1 PREGNANCY SPECIFIC DISORDERS

Adverse events

Haemorrhage

Disorders

Abortion

Spontaneous

induced

Ectopic Pregnancy

Gestational Trophoblastic Disease (Vescicular mole)

Placenta previa

Placental abruption

Scar dehiscence

Rupture uterus

Surgical injury during Caesarean Section

IIIrd Stage haemorrhage complicationsw (Inversion of uterus, retained placenta, Cervical tear)

Post partum haemorrhage

Trauma

Symptoms

Any Bleeding causing

Unconsciousness

Air Hunger

Blackouts,

Syncopal attacks with / without severe abdominal pain

Signs

Altered consciousness

Tachycardia >120/min

Low volume pulse

Bradycardia <60/min

Tachypnea >20/min

Blood Pressure

Systolic <90 mmHg

Diastolic <60 mHg

(or fall in systolic BP 30% of basal systolic if BP known)

Investigations

Acute fall Hb < 6gm (fall in haemoglobin so as to affect oxygen saturation)

Fall in oxygen saturation below 90 % on room air for>60 min

PaO2: FiO2<200

PaCO2>50mm Hg

Platelet < 50,000 (Acute Decline in platelet count more significant)

Coagulation profile altered

Serum creatinine>3.5 mg/dL

ECG-Ischemic changes, ST inversion, elevation

Absent peripheral reflexes

Intervensions

ICU admission requiring resuscitative procedure or cardio respiratory support

Massive Blood and blood products transfusion (more than 90 ml/kg body weight/ >5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/ Dobutamine/ Dopamine etc)

Resuscitative procedure done

Emergency Surgery done for controlling the blood loss such as urgent evacuation, laparotomy with or without hysterectomy, Internal iliac Ligation or any suturing of tears with a background of circulatory collapse.

Sepsis

Septic

Induced

Spontaneious

Premature rupture of membranes Term/Preterm

Puerperal sepsis

Post Surgical procedures (EG. Cesarean section, laparotomy, evacuation, manual removal of placenta, others)

High grade fever

Abdominal pain

Vaginal foul smelling discharge

Temp >39.2C

Pulse rate > 120/min

Tachypnoea>20/min

Clinical evidence of septic focus in body

Leucocytosis (>10,000/cumm)

Microbial culture positive for organisms

Ultrasound shows intra pelvic/abdominal pus like collection

Imaging modality might show bladder /bowel injuries

ICU admission for resuscitative procedure or cardiorespiratory support

Antibiotics like (Sulbactum+Cefoperazone combinations, Imepenum etc)

Blood component transfusion (upto 90 ml/kg body weight/>5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/ Dobutamine/ Dopamine etc)

Resuscitative procedure done

Surgical procedure doen (laparotomy for drainage of pus, repair of bladder, bowel)

Hypertension

Hypertensive Disorders of pregnancy (Pregnancy induced hypertension, Preeclampsia, Eclampsia HELLP Syndrome)

Convulsions

Unconsciousness

Passage of Scanty amount of urine

BP> 160/110mm Hg

Deep Jaundice

Oliguria/ anuria

Unconsciousness, coma

Coagulation failure

Pulmonary edema

Proteinuria >1 gm/dl

S.Creatinine >3.5 mg/dL

Elevated S Bilirubin (6 mg/dL)

LDH, ALT, AST (>100 IU/L)

Thrombocytopenia <50,000

Haemolysis on peripheral smear

Coagulation profile deranged

Hypertensive retinopathy >GRADE II

Abnormal ECG (ST inversion, elevation, arrhythmias)

Cerebral Hemorrhage on CT scan

ICU admission for cardio respiratory support

Repeated doses of anticonvulsants

Mechanical Ventilation

Blood and blood products transfusion

Use of Cardiotonics/ Vaso pressors (Mephentine/ Dobutamine/ Dopamine etc)

Resuscitative procedure done

1.2 PREEXISTING DISORDERS AGGRAVATED DURING PREGNANCY

Anaemia

Iron Deficiency

Sickle cell Disease

thallsemia

Syncopal Attack

Loss of consciousness

Severe Pallor

Jaundice

Tachycardia-pulse rate>120/min

Tachypnoea>20/min

Spleenomegaly

Anasarca

Ascitis

Signs of Congestive Cardiac failure

Hemoglobin status not able to maintain O2 saturation of 90% at room level.

Platelet <50,000

Coagulation profile altered

Elevated S Bilirubin (>6 mg/dL)

Features of Sickle cell crisis)

Massive Blood/ component Transfusion (Upto 90ml/kg/>5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/Dobutamine/Dopamine etc)

Resuscitative procedure done

Respiratory Dysfunction

Asthma

Tuberculosis

Pneumonia

Breathlessness

Air hunger

High Grade fever

Chronic weight loss

Tachypnoea >20/min

Abnormal chest signs (Ronchi, Crepts, Effusion)

Cardiorespiratory failure

Various lesions on chest X ray pertaining to disease

ICU admission for resuscitation and Cardiorespiratory support, Endotracheal intubation

Need for mechanical ventilation for more than 30 min (apart from anesthesia related)

Cardiac Dysfunction

Rheumatic Heart Disease

Congenital Heart Disease

Cardiomyopathies

Aortic Aneurysm

Breathlessness

Palpitations

Chest Pain

Orthopnoea

Paroxysmal nocturnal dyspnoea

Tachycardia

Dyspnoea

Murmurs

Cardiomegaly

Signs of CCF

Tender Hepatomegaly

Abnormal ECG

Abnormal Echocardiography

ICU admission for resuscitation and Cardiorespiratory support.

Ventilatory support, Digitalisation Use of cardiotonics

Hepatic Dysfunction

Cirrhosis of liver

Portal hypertension

Yellowness of urine/other body parts

Convulsions

Altered behaviour

Bleeding from various sites (nose, gums, IV access ports)

Deep Jaundice

Hepatomegaly

Hepatic flaps tremors

Haematuria

Abnormal bleeding sites

Elevated Serum Bilirubin (>6mg /dL)

Abnormal liver enzymes (>100 IU /L)

Abnormal ECG

Abnormal EEG

Coagulation profile deranged

ICU admission fro resuscitation and Cardiorespiratory support

Resuscitation

Mechanical Ventilation

Massive Blood and component transfusion

Ketoacidosis Thyroid Crisis

Gestational Diabetes mellitus

Diabetes mellitus

Thyrotoxicosis

Thyroid storm

Pheochromocytoma

Loss of Consciousness

Breathlessness

Palpitations

Air Hunger

Features of Circulatory collapse

Neurological deficit

Unconciousness

Coma

Convulsions

Ketoacidosis pH <7.1 RBS>200 g/dL

Abnormal ECG

Electrolyte imbalance (Sr Na<129 K<3.2)

SrT_4 elevated (>200 IU)

Low TSH (<.2 IU)

Ischaemic changes on ECG

Elevated Vinyl mandilic acid

ICU admission for cardio respiratory support

Mechanical Ventilation

Resuscitative procedures Management of Ketocidosis (insulin or glucagon)

Neurological Dysfunction

Epilepsy

Cortical vein thrombosis

Altered consciousness

Convulsions

Unconsciousness and coma

Abnormal Reflexes (Hyper or absent)

Cardio respiratory failure

Abnormal EEG

Abnormal acid-base status

Abnormal EEG

CT/MRI Head showing definite lesion

ICU admission

Resuscitative measures

Higher antibiotics

Mechanical ventilation

Renal Dysfunction/Failure

Medico renal disease

Renal Artery stenosis

Reduced/Absent Urine

Edema all over body

Breathlessness (due to volume overload)

Oliguria <400 ml urine output in 24 hours

Anuria

Unconsciousness/Coma

USG showing the lesion

Doppler USG showing stenotic renal artery

Need for dialysis

Resuscitative measures

ICU admission

1.3 PREGNANCY SPECIFIC MEDICAL DISORDERS

Liver Dysfunction/ Failure

Acute Fatty liver of pregnancy

Convulsions

Altered behaviour

Bleeding from various sites (nose, gums, IV access ports)

Deep Jaundice

Hepatic flaps tremors

Haematuria

Abnormal bleeding sites

Elevated Serum Bilirubin (> 6mg/dL)

Abnormal liver enzymes (>100 IU/ L)

Abnormal ECG

Abnormal EEG

Coagulation profile deranged

USG showing changes of Acute fatty liver

ICU admission for resuscitation and cardio respiratory support

Resuscitation

Mechanical Ventilation

Massive Blood and component transfusion

Cardiac Dysfunction/ Failure

Cardiomyopathy (Antepartum, Postpartum)

Breathlessness

Palpitations

Chest pain

Orthopnoea

Paroxysmal nocturnal dyspnoea

Abnormal ECG

Abnormal Echocardiography

X ray Chest showing Gross Cardiomegaly

ICU admission for Resuscitation and Cardio respiratory support

Ventilatory support Digitalisation Use of Cardiotonics

1.4 INCIDENTAL AND ACCIDENTAL CAUSES IN PREGNANCY

Accident/Assault/ Surgical problems

Trip or fall

Vehicular accident

Blunt trauma Abdomen

Assault

Burns

Poisoning

History of trauma or accident

Syncope

Pain (Abdominal or pertaining to specific site)

Blurred vision

Altered consciousness

Tachycardia > 120/min, low volume pulse

Bradycardia <60/min

Tachypnea >20/min

Blood pressure Systolic <90 mmHg

Acute fall Hb < 6 gm (fall in haemoglobin so as to affect oxygen saturation)

Fall in oxygen saturation below 90% on room air

ICU admission requiring resuscitative procedure or cardio respiratory support

Massive Blood

Cancers

Acute surgical condition

Bleeding

Convulsions

Altered behaviour

Diastolic <60 mmHg (or fall in systolic BP 30 % of basal systolic if BP known)

Tenderness, rigidity and guarding of anterior abdominal wall with distension

Cardio respiratory failure

Evidence of trauma/ burns

PaO_2 ; FiO_2<200

$PaCO_2$>50mm Hg

Platelet <50,000 Acute Decline in platelet count more significant

Coagulation profile altered

USG showing trauma to vital organs

Imaging Modality showing Injury to bladder, bowel, liver, spleen

CT/MRI showing head injury & blood products transfusion (more 90 ml/kg body weight/>5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/ Dobutamine/ Dopamine etc)

Resuscitative procedure done

Surgical procedures done (laparotomy for intraperitoneal haemorrhage, repair of bladder, bowel, spleen, liver, kidney, Burr hole for head injury)

Anaphylaxis

Anaesthetic drugs

Antibiotics

Anitmalarials

Oxytocics

Tocolytics

Iron preparations

Anticonvulsants

Antihypertensives

History of taking the drug

Breathlessness

Air Hunger

Syncope

Not passing urine

Altered consciousness

Tachycardia >120/min thready, low volume pulse

Bradycardia <60/min

Tachypnea >20/min

Blood pressure

Systolic <90 mmHg

Diastolic <60 mmHg (or fall in systolic BP 30% of basal systolic if BP known)

Oliguria/ Anuria

Fall in oxygen saturation below 90 % on room air

PaO2 : FiO2<200

PaCO2>50mm Hg

Proteinuria > 1 gm/dl

S.Creatine > 3.5 mg/dL

Elevated S Bilirubin (6 mg/dL)

LDH, ALT, AST (>100 IU/L)

Thrombocytopenia <50,000

Haemolysis on peripheral smear

ICU admission requiring resuscitative procedure or cardio respiratory support

Massive Blood & Blood products transfusion (more 90 ml/kg body weight/>5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/ Dobutamine/ Dopamine etc)

Resuscitative procedure done

Infections

Malaria

Dengue

H1N1 viral Disease

Lower respiratory tract infections

ARDS

Meningitis

Enchephalitis

Infective hepatitis (A, B, C, E)

HIV/AIDS

High Grade Fever (with/without chills and rigor)

Yellowness of urine

Altered behaviour

Breathlessness

Altered consciousness

Temp >39.2^{o}C

Pulse rate > 120/min

Tachypnoea > 20/min

Chest signs (Crepts, crackles, ronchi, decreased or absent air entry)

Neck rigidity

Convulsions

Coma

Bleeding from various sites

Leucocytosis (>10,000/cumm)

Toxic Granules on Peripheral smear

Low Platelets (<50,000)

Microbial Culture positive for organisms

Dengue, parachek, malarial parasite positive on ELISA/ peripheral smear

H1N1 ELISA positive

Spinal fluid positive for infection

Elevated Serum Bilirubin (>6 mg)

Abnormal liver enzymes (>100 IU)

Abnormal ECG

Abnormal EEG

Coagulation profile deranged

HBsAg positive

HIV ELISA positive

ICU admission for resuscitative procedure or cardio respiratory support

Higher antibiotics (Sulbactum + Cefoperazone combinations, Imepenum)

Blood component transfusion (upto 90 ml/kg body weight/ >5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/Dobutamine/ Dopamine etc)

Resuscitative procedure done

Injectable antimalarials

Use of drugs to relieve cerebral odema (Mannitol)

Antiretroviral therapy

Embolism and Infarction

Pulmonary Embolism

Cerebral Embolism (Stroke)

Cardiac Embolism

Breathlessness

Air hunger

Collapse

Tachypnoea > 20/min

Abnormal Chest signs (Ronchi, Crepts, effusion)

Various lesions on chest X ray pertaining to disease

ICU admission for resuscitative procedure or Cardio respiratory support

Myocardial infarction)

Acute chest pain

Syncope

Cardiorespiratory failure

Abnormal EEG, ECG

CT/MRI showing Lesion

Blood component transfusion (upto 90 ml/kg body weight/ >5 units of blood)

Use of Cardiotonics/ Vaso pressors (Mephentine/Dobutamine/Dopamine etc)

Anticoagulant Therapy

Drugs to reduce Cerebral Odema (Mannitol)

Clinical criteria

Acute cyanosis loss of consciousness lasting ≥ 12 hours[e] gasping[a] loss of consciousness and absence of pulse/heart beat respiratory rate >40 or <6/min stroke[f] shock[b] uncontrollable fit/total paralysis[g] Oliguria non responsive to fluids or diuretics[c] Jaundice in the presence of pre-eclampsia[h] Clotting failure[d].

Laboratory-based criteria

Oxygen saturation<90% for ≥ 60 minutes pH <7.1 PaO2/FiO2 <200 mmHg Lactate>5 Creatinine ≥ 300 umol/1 or ≥ 3.5 mg/dl Acute thrombocytopenia (<50 000 platelets) Bilirubin> 100 umol/1or 6.0mg/dl Loss of consciousness and the presence of glucose and ketoacids in urine.

Management –based criteria

Use of continuous vasoactive drugs[i] Intubation and ventilation for ≥ 60 minutes not related to anaesthesia Hysterectomy following infection or haemorrhage Dialysis for acute renal failure Transfusion of ≥ 5 units red cell transfusion Cardio-pulmonary resuscitation (CPR).

a. Gasping is a terminal respiratory pattern and the breath is convulsively and audible caught.
b. shock is a persistent severe hypotension, defined as a systolic blood pressure <90mmHg for≥ 60 minutes with a pulse rate at least 120 despite aggressive fluid replacement (>21).
c. Oliguria is defined as an urinary output <30 ml/hr for 4 hours or < 400ml/24hrs.
d. Clotting failure can be assessed by the bedside clotting test of clotting from the IV site after 7-10 minutes.
e. Loss of consciousness is a profound alteration of mental state that involves complete or near-complete or near complete lack of responsiveness to external stimuli. It is defined as a Coma Glasgow Scale <10 (moderate or severe coma). Details on the scale on the Fig.3.
f. Stroke is neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours.
g. Condition in which the brain is in a state of continuous seizure.
h. Pre-eclampsia is defined as the presence of hypertension associated with proteinuria. Hypertension is defined as a blood pressure of at least 140mmHg (systolic) or at least 90mmHg (diastolic) on at least two

occasions and at least 4-6 h apart after the 20th week of gestation in women known to be normotensive beforehand. Proteinuria is defined as excretion of 300mg or more of protein every 24h. urine samples are not available, proteinuria is defined as protein concentration of 300mg/l or more (≥ 1 + on dipstick) in at least two random urine samples taken at least 4-6 h apart.

i. For instance, continuous use of any dose of dopamine, epinephrine of nourepinephrine.

Organ system-based

1. Cardiac dysfunction

Pulmonary oedema: a clinical diagnosis necessitating intravenous furosemide or intubation, Cardiac arrest.

2. Vascular dysfunction

Hypovolaemia requiring ≥ 5 units whole blood or packed cells for resuscitation.

3. Immunological dysfunction

Intensive care admission for sepsis

4. Respiratory dysfunction

Intubation and ventilation for more than 60 min for any reason other than for a general anaesthetic. Oxygen saturation on pulse <90% lasting more than 60 min. The ratio of the partial pressure of oxygen in arterial blood to the percentage oxygen in inspired air is ≤ 3 (i.e paO2/FiO2≤ 3).

5. Renal dysfunction

Oliguria, defined as <400ml/24h, which does not respond to either careful adequate intravascular rehydration or attempts at inducing a dieresis with fourosemide or dopamine. Acute deterioration of urea to >15mmol/1 or of creatinine to >400mmol/1.

6. Liver dysfunction

Jaundice in the presence of pre-esclampsia. Pre-eclampsia defined here as a blood pressure ≥ 140/90 together with ≥ 1+ proteinuria.

7. **Metabolic dysfunction**
   Diabetic keto-acidosis. Thyroid crisis.

8. **Coagulation**
   A cute thrombocytopenia requiring a platelet transfusion.

9. **Cerebral dysfunction**
   Coma in a patient lasting > 12h. Subarachnoid or intracerebral haemorrhage.

Management-based

1. Intensive care admission
   For any reason

2. Emergency hysterectomy
   For any reason

3. Anaesthetic accidents
   Severe hypotension associated with a spinal or epidural anaesthetic. Hypotension defined as a systolic pressure <90 mmHg lasting >60min. Failed tracheal intubation requiring anaesthetic reversal.

FACILITY BASED MATERNAL NEAR MISS REVIEW FORM (MNM-R FORM)

Type of facility: (Circle one)

Primary Health Centre /Sub-District Hospital/ Rural Hospital/ Community Health Centre	District Hospital	Medical College	Public Hospital	Private Hospital	Others

Name of the Nodal Person at the facility where treatment was done _____

Address _____

Contact No. _____ Block: (Wherever necessary)_____

District: _____ State:_____

For Office use only

FB MNM-R No/ Aadhar No (Specific to the Place) | | | | | | | | | | | | | | | | | | |

Month | | |

Year | | | | |

Please fill up the proforma given below

NOTE:

- **FB MNM-R number must be put serially starting from 000000000000000001**
- **This form must be filled for all cases of Maternal Near Miss as per Definition**
- **Mark with X or √ wherever applicable**
- **For Date use Day/Month/Year format. For time use 24hours clock format.**
- **Complete the form within 24 hours of discharge of the woman with Maternal Near Miss, keep photocopy at the Department & send the original to the Nodal Officer MNM - R Committee**

Residential Address of Treated Woman

Name:_____ Husband/Partner Name:_____

House Number_____ Locality_____ Street Name_____ Village Name_____

Contact No. _____ Block: _____

District: _____ State:_____

1. DETAILS OF THE MATERNAL NEAR MISS CASE

a. Inpatient Number: _____

b. Name: _____

c. Age (years) :<19 Yrs ☐, 20-29 Yrs ☐, 30-40 Yrs ☐, > 40 Yrs ☐

d. Education: Illiterate ☐, Primary ☐ (upto class 7th), Secondary ☐ (upto class 10th), Higher Secondary ☐ (upto class 12th), Graduate ☐

Postgraduate/ Professional ☐

e. Socio Economic Status :Upper ☐, Upper Middle ☐, Middle ☐, Upper Lower ☐, Lower ☐
(Refer Annex 1 - Kuppuswami's classification 2009)

f. Patient admitted in the Hospital as Near Miss ☐

g. Referred from outside as Near Miss /Complicated case☐

h. Admitted with no disorder and became Near Miss ☐

i. Admitted with disorder and became Near Miss ☐

j. If referred from outside, prior visit to how many centers? ☐☐ Specify type Public ☐ Private ☐

k. Duration from illness to admission: Days ☐☐, Hours ☐☐

l. Duration of onset of complication in admitted patient : Days ☐☐, Hours ☐☐

2. ON ADMISSION

a. Antenatal ☐, Intra-natal ☐, Postnatal ☐, Abortion ☐, Post abortion ☐

b. Condition on Admission: Stable with no disorder ☐, Stable with disorder ☐, Serious ☐

c. Days since delivery/abortion: Within 6 hrs. ☐, Within 24 hrs. ☐, Within 72 hrs. ☐, Within 1 week ☐,
1 - <2 weeks ☐, >2 weeks ☐

d. Date of admission: Day☐☐ Month☐☐ Year☐☐ Time of admission: Hours ☐☐ Min ☐☐

e. Gravidity: G_1 ☐, $G_{2,3,4}$ ☐, G_5 or More ☐

f. Parity: P_1☐, $P_{2,3,4}$☐, P_5& more☐

g. Abortions: A_1 ☐, A_2☐, A_3 or more ☐

h. No. of Living children: 1 ☐, 2 ☐, More than 2 ☐

i. Date of Discharge: ☐☐ ☐☐ ☐☐

j. Type of Discharge: Hospital discharge ☐, Against Medical advice (DAMA) ☐, Against Medical advice (LAMA) ☐, Absconded ☐, Referred to Other Centre ☐

k. Duration of Hospital stay : Days ☐☐ Hours ☐☐

l. Duration of ICU stay: Days ☐☐ Hours ☐☐

3. BASIC DISORDERS

Haemorrhage (Bleeding)						
Early pregnancy (•<22 Weeks)				APH in late pregnancy (22 Weeks onwards)		
Abortion	Ectopic Pregnancy	Gestational Trophoblastic Disease	Others	Placenta previa	Abruption placenta	Others

•International consensus on period of viability being 22 weeks. (Reference No 2)

Infection (Sepsis)				Late pregnancy Bleeding other than APH		Intrapartu Bleeding	Postpartum bleeding			Incidental / Accidental causes	Others
Antepartum	Intrapartum	Postpartum	Postabortal	Scar dehiscence	Rupture uterus		Atonic	Traumatic	Mixed		

Hypertensive disorders of pregnancy			Other Medical Disorders					
Severe Pre-eclampsia	Eclampsia	Others	Anaemia with cardiac decompensation	Heart disease with cardiac decompensation	Hepatitis	Diabetic Ketoacidosis	Pneumonia	Others

4. ANTENATAL PERIOD

a. Did she receive ANC? Yes ☐ No ☐ Number of Visits: ☐☐

b. If Yes,

i. Type of Care Provider : TBA ☐, ANM ☐, MO PHC ☐, MO CHC ☐, SSDH ☐, SpDH ☐, SpMC ☐, DPu H ☐, DPrH ☐.

ii. Was she informed about the problems in present pregnancy? Yes ☐ No ☐

iii. Was appropriate referral done? Yes ☐ No ☐

Type of Disorder	Adverse event	Yes	No	Don't know	Other
Ectopic/ Abortion	Vaginal bleeding, pain in abdomen				
APH	Vaginal/Intrauterine bleeding				
Abnormal Presentation/lie	Obstructed labour				
Multiple pregnancy	Obstructed labor & problem with 2nd twin				
Previous C/Section	Rupture uterus				
Hypertension	Convulsion, Renal & Hepatic failure,				

	Cerebral haemorrhage				
Anaemia	Cardiac failure				
Heart disease	Cardiac failure				
Diabetes	Hypoglycaemia & Coma				
Resp disease	Respiratory failure				
Jaundice	Liver failure, Coma				
Others (Please specify)					

MO - Medical Officer, DPu. H - Doctor Public Hospital, PHC - Primary Health Centre, DPr. H - Doctor Private Hospital, CHC - Community Health Centre, SSDH - Specialist Sub District Hospital, SpDH - Specialist District Hospital, SpMC - Specialist Medical College

c. If No, reason: Lack of awareness ☐ Lack of accessibility ☐ Lack of funds ☐ Lack of attendee ☐ Family problems ☐

d. Comments on antenatal care - List any medication (If known or documented)

5. SYMPTOMATOLOGY

Sr. No.	Symptom with which the woman presented	Gestational Age	Duration
1	Vaginal bleeding		
2	Vaginal discharge		
3	High grade fever		
4	Abdominal pain		
5	Severe headache		
6	Swelling of feet / body		
7	Blurring of vision		
8	Right upper quadrant pain		
9	Passing of scanty amount of urine		
10	Convulsion		
11	Unconsciousness		
12	Syncope		
13	Breathlessness		
14	Palpitations		
15	Chest pain		
16	Orthopnea		
17	Jaundice		
18	Altered sensorium		
19	Others		

Sr. No.	Systems	Examination	At Admission	At Discharge	Systems	Examination	At Admission	At Discharge
		Date & Time of examination			ABDOMINAL FINDINGS	Soft / Guarding		
1	General	Temp (°C)				Tenderness		
2		Pulse/min				Distension		
3		Respiration/min				Bowel Sounds		
4		Blood pressure				Scars		
5		Pallor			PER SPECULUM			
6		Icterus				Cervix		
7		Cyanosis				Vagina		
8		Clubbing				Others		
9		Cervical LNP			PER VAGINUM			
10		Oedema (Feet/Face)				Cervical position		
11		JVP				Cervical consistency		
						Cervical dilatation		
1	CNS	Consciousness				Cervical effacement		
2		Orientation				Membrane's Status		
3		Pupils (Size, LR)				Station of Head		
4		Any neurodeficit				Liquor		
						Others		
1	CVS	Any abnormality Detected				Uterus Position		
2						Uterus Size		
						Uterus Consistency		
1	RS	Any abnormality detected				Uterine tenderness		
2						Cervical finding		
1	ABDOMINAL FINDINGS	Fundal height				Bilateral fornices		
2		Activity				Others		
3		Presentation/Position			OTHERS			
4		Baby size						
5		Liquor						
6		FHS						

7. INVESTIGATIONS

Sr. No.	Type	Samples Collected	At Admission	At Discharge	Type	Samples Collected	At Admission	At Discharge
1	CBC	Hb			Infectious Diseases Screening	HIV – I & II		
2		TLC				HBsAg		
3		Plt				VDRL		
4		Other				Rapid Dengue		
	Blood					Rapid Malaria		
1		Blood group and rh type				Widal		

2		Hb – Electro				Blood C/S		
						Urine C/S		
1	Urine	Urine albumin				Cervical Swab		
2		Urine sugar				Vaginal Swab		
3		Urine ketone				Lochial Swab		
4		Urine microscopy						
					Fundus Exam.	Ophthalmoscopy		
1	BSL	BS (F)						
2		BS (PP)			Imaging	USG – Obst & Obst - Doppler		
3		BS.(RBS)				Xray chest/ abdomen CT / MRI		
4								
1	KFT	Creatinine			Others			
2		Urea						
3		Na^+						
4		K^+						
1	LFT	Alk phos						
2		SGPT						
3		SGOT						
4		Bili (Total)						
5		Bili (Direct)						
6		Prot (Total)						
7		Albumin						
8		Globulin						

8. DELIVERY, PUERPERIUM AND NEONATAL INFORMATION

a. Did she have labor pains? Yes ☐ No ☐

b. If Yes, was a partograph used? Yes ☐ No ☐ Don't know ☐

c. In which phase of labor she developed complications?

Latent phase	Active phase	Second stage	Third stage	Within 6 hrs.	Within 24 hrs of birth	> 24 hrs after birth

d. Duration of labour: Hours ☐☐ Minutes ☐☐

9. DELIVERY RECORDS

a. Mode of Delivery

Undelivered	Normal delivery.	Abnormal vaginal Delivery	Vaginal(assisted)	Vacuum/forceps	Caesarean Section

Episiotomy/ Perineal tears repair	Cervical tear/ Vaginal exploration	Abdominal exploration

c. Who conducted the delivery?

ANM ☐ Nurse ☐ Resident Doctor ☐ Jr. Consultant (< 5 yrs) ☐ Sr. Consultant (> 5 yrs) ☐ Others ☐

d. Details of Caesarean Section

i. Intrapartum Complications - Intrapartum Haemorrhage ☐, Sepsis ☐, Intrapartum Eclampsia ☐, Others ☐

e. Puerperium: - Uneventful ☐ Eventful ☐

i. If Eventful - PPH ☐, Sepsis ☐, Post Partum Eclampsia ☐,Others ☐

f. Blood transfusions required: Yes☐ No ☐

i. Blood transfusion given in which period : Antenatal ☐, Intranatal ☐, Postnatal ☐

g. Indication for Blood transfusion

h. If YES, Number of Blood & Blood Components transfused:

Sr. No.	Components	Quantity	Total
1	Whole Blood / Packed cells/ Sedimented cells		
2	FFP		
3	Platelets		

10. DETAILS OF BABY

a. Gestational Age/Weight/Apgar Score

Gestational age in Weeks		Baby weight in Kgs		Five minute Apgar Score	
< 22		< 2		< 5	
22 – 28		2 – 2.5		5- 8	
29 – 32		>2.5 – 3		> 8	
33 – 37		>3 - 3.5			
> 37		>3.5			

b. Outcome

Outcome									
Stillborn		Live birth						Admitted in NICU	
Fresh	Macerated	Immediate Neonatal Deatth (NND)	NND within 6 hrs	NND within 24 hrs	NND within 7days	NND 7 – 28 days	Discharged	Discharged	Died

c. Needed resuscitation: Yes ☐ No ☐

i. If yes, who gave ENBC?

ANM☐, PHCs Doctor☐, CHCs Doctor☐, Secondary/ Tertiary Level Care Doctor☐

11. **SYSTEM INVOLVEMENT:** Single ☐ Multiple ☐

Central Nervous System	☐	Genito – Urinary System	☐
Cardiovascular System	☐	Haematological System	☐
Respiratory System	☐	Immune System	☐
Gastrointestinal System	☐	Musculoskeletal System	☐

12. **CONDITION AT DISCHARGE**

Completely recovered ☐, Residual major morbidity ☐, Residual minor morbidity ☐

CONSENT FORM

STUDY TITLE **:** MATERNAL NEAR MISS MORBIDITY-AN ANALYSIS OF 50 CASES

STUDY CENTRE **:** Institute of Social Obstetrics and Govt. KGH, Chennai.

PARTICIPANT NAME : **AGE:** **SEX**: **J.D.NO.**

I confirm that I have understood the purpose of procedure for the above study, I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.

I understand that the investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties of published, unless as required under the law. I agree not to restrict the use of any results that arise from the study.

I hereby consent to participate in this study of **:** "MATERNAL NEAR MISS MORBIDITY: AN ANALYSIS OF 50 CASES"

.

Signature of Investigator:

Place :
Date :

Study Investigators Name

Institution

Signature / Thumb Impression of patient

INFORMATION SHEET

STUDY TITLE : MATERNAL NEAR MISS MORBIDITY-AN ANALYSIS OF 50 CASES
"

INVESTIGATOR : Dr. M.PARAMESWARI,M. S.,OG (POST GRADUATE)

GUIDE : **Prof. Dr**. RAMANI RAJENDRAN M.D., DGO.,
Professor,
Institute of Social Obstetrics
Govt. Kasturi Bai Gandhi Hospital,
Madras Medical College, Chennai- 600 003.

CHIEF CO-ORDINATOR:

Prof. Dr. **DILSATH,** M.D., DGO.,
Director & Professor,
Institute of Social Obstetrics
Govt. Kasturi Bai Gandhi Hospital,
Madras Medical College, Chennai- 600 003.

INDRODUCTION

Maternal near miss has now gained interest as a new quality indicator of obstetric care. Maternal deaths, although a significant public health problem,are rare events in absolute terms in particular when they are studied within an individual facility.Maternal near miss situations tend to mirror the causes of maternal deaths and therefore,incorporating maternal near miss analysis in assessing the process of obstetric care will be a valuable contribution in taking necessary action to improve the quality of care.

Borrowed from the airline industry,"near miss" in health care literature generally describes a condition that did not result in injury,illness or damage- but had the potential to do so.However, in the context of maternal health,the near miss term has been historically used referring to a condition where a woman experienced a severe complication,nearly died,but survived.

From the theoretical standpoint,a woman can be recognized as a maternal near miss case only retrospectively.By definition,a woman needs to survive the severe complication to become a maternal near miss case.However,it is considered clinically useful to have the possibility of prospectively identifying the women presenting with life-threatening

conditions.At the end of the process,a woman with a life –threatening condition will become either a maternal near miss case or a maternal death.

All selected patients will be included in this study only after getting informed consent. Extra cost will not be incurred to the patient by this study. Any doubt regarding this study will be willingly clarified. Results of the study will be published.

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

EC RegNo.ECR/270/Inst./TN/2013
Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To
Dr.M.Parameswari,
PG in MS (OG),
Institute of Social Obstetrics Govt. Kasturba Gandhi Hospital,
Madras Medical College, Chennai-3

Dear Dr.M.Parameswari,

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled "Maternal near miss morbidity – An analysis of 50 cases" No.15072013.

The following members of Ethics Committee were present in the meeting held on 02.07.2013 conducted at Madras Medical College, Chennai -3.

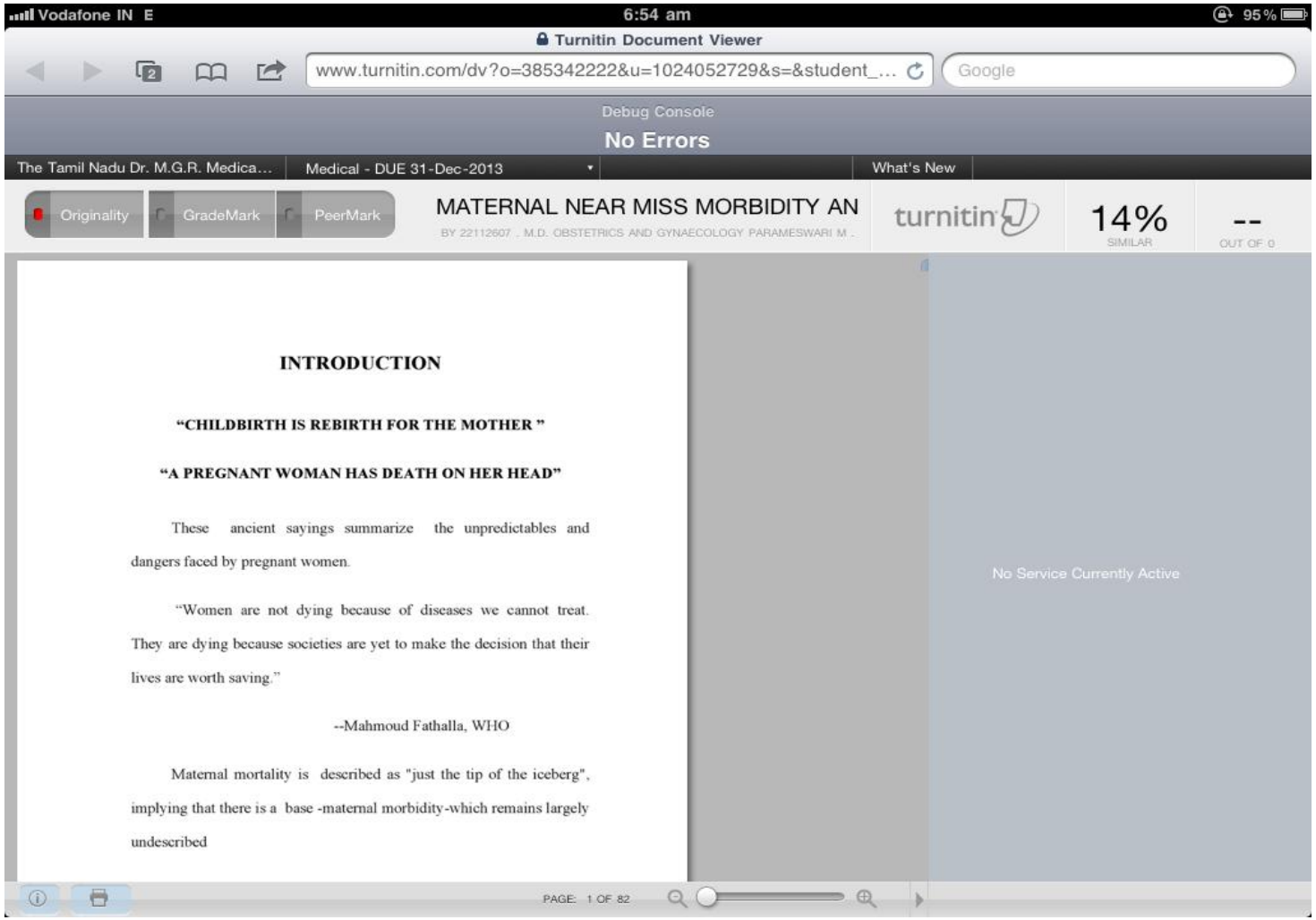
1. Dr.G.SivaKumar, MS FICS FAIS --- Chairperson
2. Prof. R. Nandhini MD -- Member Secretary
   Director, Instt. of Pharmacology ,MMC, Ch-3
3. Prof. Shyamraj MD -- Member
   Director i/c , Instt. of Biochemistry , MMC, Ch-3
4. Prof. P. Karkuzhali. MD -- Member
   Prof., Instt. of Pathology, MMC, Ch-3
5. Prof. Kalai Selvi -- Member
   Prof of Pharmacology, MMC, Ch-3
6. Prof. Siva Subramanian, -- Member
   Director, Instt. of Internal Medicine, MMC, Ch-3
7. Thiru. S. Govindsamy. BABL -- Lawyer
8. Tmt. Arnold Saulina MA MSW -- Social Scientist

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

R Nandini 12/7/13
Member Secretary, Ethics Committee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Medical - DUE 31-Dec-2013
What's New
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MATERNAL NEAR MISS MORBIDITY AN
BY 22112607 , M.D. OBSTETRICS AND GYNAECOLOGY PARAMESWARI M .
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INTRODUCTION
"CHILDBIRTH IS REBIRTH FOR THE MOTHER "
"A PREGNANT WOMAN HAS DEATH ON HER HEAD"
These ancient sayings summarize the unpredictables and dangers faced by pregnant women.
"Women are not dying because of diseases we cannot treat. They are dying because societies are yet to make the decision that their lives are worth saving."
--Mahmoud Fathalla, WHO
Maternal mortality is described as "just the tip of the iceberg", implying that there is a base -maternal morbidity-which remains largely undescribed
No Service Currently Active
PAGE: 1 OF 82

Pt.NAME	REASON FOR BEING CLASSIFIED AS NEAR MISS[WHO CRITERIA THAT IS FULFILLED]	ADMN WITH NO DISORDER AND BECAME NEARMISS	REASON FOR NEAR MISS	ORGAN SYSTEM	ADVERSE EVENT[WHO]	DISORDER [WHO]	ANY OTHER COMTRIBUTING FACTOR	INTER PREG INTERVAL< 18 mt	> 18 mt	h/o PIH	h/o DM	GDM	Pregnancy specific	pre existing aggravated	PS medical disorders	INCI /ACCI causes
SENGENI	A/P	1	d	[C]	Y	Y	o	o	o	o	o	o	YES	o	o	o
veronika(mod)	A/X/L	o	d	[C&H]	Y	Y	N	o	1	o	o	o	YES	o	o	o
PRIYA W/O KUMAR	A/P/Z	o	d	[C]	Y	Y	o	o	o	o	o	o	YES	o	o	o
DAISY INFANTA	A/D	o	d	C&H	Y	Y	M	o	o	o	1	o	YES	o	o	o
MALA	A/U	o	U	C&H	Y	Y	o	o	1	1	o	o	YES	o	o	o
AYSHA	A/L	o	d	C&H	Y	Y	M	o	o	o	o	1	YES	o	o	o
mahalakshmi	A	o	d	C	Y	Y	Y	o	1	o	o	o	YES	o	o	o
HEMAVATHY	A	o	d	C&H	Y	Y	o	o	o	o	o	o	YES	o	o	o
MUTHAMILSELVI	A	o	d	C&H	Y	Y	o	o	o	o	o	o	YES	o	o	o
SUMATHY VASANTHAKUMA	A	o	d	C&R	Y	Y	o	o	o	o	o	o	YES	o	o	o
PRIYA KANI	A	o	d	C	Y	Y	o	o	o	o	o	o	YES	o	o	o
MALARKODI	P	o	d	C	Y	Y	N	o	o	o	o	o	YES	o	o	o
sivanandini	A	o	d	C	Y	Y	N	o	o	o	o	o	YES	o	o	o
DOWLATH BEGUM	P/Z	o	d	C	Y	Y	o	o	o	o	o	o	YES	o	o	o
JAMUNA RANI	P	1	d	C&H	Y	Y	o	o	o	o	o	o	YES	o	o	o
SELVAMAHA	I	o	d	C	Y	Y	o	o	1	o	o	o	YES	o	o	o
kodhai	I	o	d	C	Y	Y	o	o	o	o	o	o	YES	o	o	o
MANJUULA	I	o	d	C&H	Y	Y	o	o	o	o	o	o	YES	o	o	o
NIKKANTH	r/a	o	r	R	Y	Y	o	o	1	1	o	o	YES	o	o	o
KRISHNAVENI	a/D	o	h	R&H	Y	Y	o	o	o	o	o	o	YES	o	o	o
VASANTHI RAJA	a/r/m	o	r	R	Y	Y	N	o	1	o	o	o	YES	o	o	o
geethalakshmi 1.12.13	U	1	U	H	E	D	N	o	1	0	o	o	yes	o	o	o
HAMEEDHA	D/i	o	h	H	E	D	o	o	o	o	o	o	yes	o	o	o
ANJALI SEKAR	U	1	U	R&H	E	D	o	1	o	o	o	o	yes	o	o	o
farzana	D/i	o	h	H	E	D	o	o	1	o	o	o	yes	o	o	o
PONRANI	U	1	U	H	E	F	o	o	o	o	o	o	yes	o	o	o
JAYACHITRA	U	1	U	H	E	D	o	o	1	o	o	o	yes	o	o	o
NITHYA PANNEERSELVAM	D/i	o	h	R&H	E	D	o	o	o	o	o	o	yes	o	o	o
AMSA BACKIARAJ	U	o	U	R&H	E	D	o	o	o	o	o	o	yes	o	o	o
DEEPA	D/U	1	U	H	E	D	o	o	1	o	o	o	yes	o	o	o
AKILA	U	o	h	H	E	U	o	o	o	o	o	o	yes	o	o	o
RADHIKA	D	o	h	H	E	D	o	o	1	o	o	o	yes	o	o	o
kalpana w/o veera	i	1	h	H	E	U	o	o	1	o	o	o	yes	o	o	o
CHITRAKANDDHAVEL	D/U	1	U	H	E	U	M	o	1	o	1	o	yes	o	o	o
VINNARASI[ectopic]	e	o	h	H	E	e	o	o	o	o	o	o	yes	o	o	o
CHITRA VENKATESH[ectopic]	e	o	h	H	E	e	o	o	1	o	o	o	yes	o	o	o
SHANTHI[ectopic]	e	o	h	H	E	e	o	o	o	o	o	o	yes	o	o	o
SATHYA	B	o	f	c	C	f	o	o	o	o	o	o		o	o	o

MADHUMATHI	B	o	f	c	C	f	o	o	o	o	o	o		1	o	o
MONIKA[seizure disorder]	B	o	f	c	C	f	o	o	1	o	o	o		1	o	o
KANCHANA	X	o	h	H	E	Y	N	o	1	o	o	o	yes	o	o	o
NADHIYA	D/i	1	v	H	E	D	N	o	1	1	o	o	yes	o	o	o
ATHISAYA	i	1	v	H	E	D	o	1	o	o	o	o	yes	o	o	o
ABIBA BANU	a	o	a	C	Y	a	o	o	1	o	o	o	1	o	o	o
VALLI	P	o	d	C	Y	P	o	o	1	o	o	o	1	o	o	o
VARALAKSHMI	e	o	h	H	E	e	o	o	1	o	o	o	1	o	o	o
UDHAYAKUMARI	X	o	h	H	Y	X	o	o	1	o	o	o	1	o	o	o
ELAKKYA	F	1	h	H	Y	D	o	o	1	o	o	o	1	o	o	o
DEBORAH	X	o	Y	H	E	X	o	o	1	o	o	o	1	o	o	o
NAVITHA BEE	i	1	v	H	Y	D	o	o	1	o	o	o	1	o	o	o

A-antepartum eclapsia ;a--severe preeclapsia ;d--cerebral dysfunction
B--cardiac dysfunction ;L--HELP ;f--card C-central nervous system
C--central nervous system ;c--cardiac system ;F--pla H-haematological system
D--atonic PPH P--postpartum eclapsia R-respiratory Y-hypertension
E--haemorrage ;e-- ectopic/rupture c-cardiac sys E-haemorrage
H--haemalological system ;m--mgso4 toxicity ;h--hypovolumia >5 C- cardiac dysfunction
I--iminant eclapsia ;i--iliac/uterineartery ligation
R--respiratory system ;r--acute pulmonary oedema
U--uterine rupture//sub /total hystrecomy ;v--impending hypovolumia <5 units of blood&products used
X--abruptio placentae ;Y--hypertension ;M--diabetes
Z--PRES ;N--anaemia ;K---LSCS
o--NO ;1----YES ;L---labor natural

AT ADMN	REF	ADMN WITH DISORDER	WITH NO DISORDER	PREV 1 LSCS	PREV 2 LSCS	1-12wk	13-28 wk	>28 wk	PN	KGH TO RGGGH	CLASS I	CLASS II	CLASS III	< 19	20 - 29yrs	30 -40 yrs	>40 yrs	ILLITERATE	PRIMARY	SECOND	Hr.SEC	GRADUATE	PRIMI	G2.3,4
o	o	o	1	o	o	o	o	1	o	o	o	1	o	o	o	1	o	1	o	o	o	o	1	o
1	1	o	o	o	o	o	o	1	o	o	o	o	1	o	1	o	o	o	o	1	o	o	o	1
1	1	o	o	o	o	o	o	1	o	o	o	1	o	o	1	o	o	1	o	o	o	o	1	o
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1	1	o	o	o	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	o
o	o	1	o	o	o	o	o	1	o	o	o	1	o	o	1	o	o	o	o	1	o	o	1	o
1	o	o	o	o	o	o	o	1	o	o	o	1	o	o	o	1	o	1	o	o	o	o	o	1
o	o	o	1	o	o	o	o	1	o	o	1	o	o	o	o	1	o	o	o	o	o	1	o	1
1	o	o	o	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	o
o	o	o	1	1	o	o	o	1	o	o	o	o	1	o	1	o	o	1	o	1	o	o	o	1
1	1	o	o	1	o	o	o	o	1	o	1	o	o	o	1	o	o	o	o	1	o	o	o	o
o	o	o	1	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1
o	o	o	1	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1
1	1	o	o	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	o
1	1	o	o	1	o	o	o	o	1	o	1	o	o	o	1	o	o	o	o	1	o	o	o	o
o	o	o	1	o	1	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1
1	o	o	o	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	o	o	1	o	1
1	1	o	o	1	o	o	o	o	1	o	1	o	o	o	1	o	o	o	o	1	o	o	o	o
o	o	o	1	o	1	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1
o	o	o	1	1	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	1
1	1	o	o	1	o	1	o	o	o	o	o	o	o	o	1	o	o	o	1	o	o	o	o	1
1	1	o	o	o	o	1	o	o	o	o	o	o	o	o	1	o	o	o	o	1	o	o	o	1
1	1	o	o	o	o	1	o	o	o	o	o	o	o	o	o	1	o	o	o	o	1	1	o	
1	o	o	o	o	o	o	o	1	o	1	o	1	o	o	1	o	o	o	1	o	o	o	1	o

1	o	o	o	o	o	o	o	o	1	o	1	o	1	o	o	1	o	o	o	o	o	o	1	1	o
1	o	o	o	o	o	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1
1	1	o	o	o	o	o	1	o	o	o	o	o	1	o	o	1	o	o	o	o	o	1	o	1	
o	o	o	o	o	1	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1	
o	o	o	1	o	1	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	o	o	o	1	
1	o	o	o	1	o	o	o	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	
1	o	o	o	o	o	o	o	1	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	1	
1	o	o	o	o	o	o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	o	o	o	1	
1	o	o	o	o	o	o	o	o	1	o	o	o	1	o	1	o	o	o	o	1	o	o	o	o	o
o	o	o	1	o	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	o	o
1	o	o	o	o	o	o	o	1	o	o	o	o	1	o	o	1	o	o	o	1	o	o	o	o	o
o	o	o	1	o	1	o	o	1	o	o	o	1	o	o	o	1	o	o	o	1	o	o	o	o	o

G5>5	P1	P2,3,4	P5&more	E1	A1	A2	A3or more	LIVE 0	living1	living2	living >2	not recd AN care	B&I	PVT	PHC	GH	orporation	KGH	< 37 wk	>37wk	< 2kg	2 -2.5kg	2.5-3 kg	3-3.5kg	>3.5kg	MODE OF DELIVERY
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	1	o	o	o	o	1	o	o	o	o	1	K
o	1	o	o	o	o	o	o	1	o	o	o	o	1	o	o	o	1	o	1	o	1	o	o	o	o	K
	o	o	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	o	1	o	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	1	o	o	o	o	1	o	o	1	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	1	o	o	o	o	o	o	1	o	o	o	1	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	1	o	o	o	o	1	o	o	1	o	o	o	K
	1	o	o	o	o	o	o	o	1	o	o	o	1	o	1	o	o	o	o	1	o	o	1	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	1	o	o	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	1	o	o	o	o	1	o	1	o	o	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	1	o	o	o	o	1	o	o	o	o	1	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	1	o	o	o	o	o	1	o	o	1	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	1	o	o	o	o	o	o	1	o	1	o	o	o	o	Q
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	1	o	o	1	1	o	1	o	o	o	o	Q
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	o	o	1	o	o	Q
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	1	o	o	o	1	o	o	1	o	o	o	K
o	1	o	o	1	1	o	o	o	1	o	o	o	1	o	1	o	o	o	1	o	1	o	o	o	o	Q
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	o	1	o	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	1	o	o	o	o	K
1	o	1	o	o	1	o	o	o	o	1	o	o	1	1	o	o	o	o	o	1	o	o	1	o	o	Q
o	o	o	o	o	o	o	o	o	o	o	o	o	1	o	1	o	o	o	o	1	o	o	1	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	1	o	o	o	o	1	o	o	1	o	o	K
o	o	1	o	o	o	o	o	o	o	1	o	o	1	1	o	o	o		o	1	o	1	o	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	1	o	o	o	o	1	o	o	1	o	o	Q
o	o	1	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	1	o	1	o	o	1	o	o	K
o	o	1	o	o	o	o	o	o	o	1	o	o	1	o	o	1	o	o	o	1	o	o	1	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	o	1	o	o	o	1	o	o	1	o	o	K
o	1	o	o	o	1	o	o	o	1	o	o	o	1	o	1	o	o	o	1	o	o	1	o	o	o	K
o	1	o	o	o	o	o	o	1	o	o	o	o	1	o	o	1	o	o	o	1	o	o	1	o	o	K
o	1	o	o	o	1	o	o	o	1	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	Q
o	o	1	o	o	o	o	o	o	1	o	o	o	1	o	1	o	o	o	o	1	o	o	1	o	o	K
o	o	1	o	o	o	o	o	o	1	o	o	o	o	o	o	o	o	o	o	1	o	o	1	o	o	Q
o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	o	o	o	1	1	o	1	o	o	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	Q
o	o	1	o	o	o	o	o	o	1	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	K
o	o	o	o	o	o	o	o	o	o	o	o	o	1	1	o	o	o	1	1	o	1	o	o	o	o	Q

o	o	o	o	o	o	o	o	o	o	o	o	o	1	1	o	o	o	o	1	o	o	1	o	o	o	K
o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	o	o	o	1	o	1	o	1	o	o	o	Q
o	1	o	o	o	o	o	o	o	1	o	o	o	o	o	o	o	1	o	1	o	1	o	o	o	o	emerrgency hysterotomy
o	o	1	o	o	1	o	o	o	1	o	o	o	1	o	o	o	o	1	o	1	o	1	o	o	o	U
o	o	1	o	o	o	o	o	o	1	o	o	o	1	o	o	o	o	o	o	o	1	o	o	o	1	o	K