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A retrospective analysis: Maternal mortality at a tertiary care centre in a Hilly state of India

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Abstract

Objectives: To analyze the causes and risk factors associated with maternal mortalities in Department of Obstetrics and Gynaecology, Kamla Nehru Hospital IGMC Shimla, with a further interest in drawing up implementable ways to reduce mortality rates in the future.

Materials and Methods: This was a retrospective study carried out at Department of Obstetrics and Gynaecology, KNH, IGMC Shimla, HP with the details collected from the patient case sheets and the maternal review death forms from January 2015 to December 2018.

Results: There were 42 cases of maternal mortality over a period of 4 years. The MMR of the four years was 162.43. Various causes of death in these 42 patients, according to the WHO-ICD 10 criteria, were hypertensive toxemia 21.40% (n=9), fulminant hepatitis 19.40% (n=8), sepsis 16.60% (n=7), and hemorrhage 11.9% (n=5).

Conclusion: The various causes of maternal mortality are either preventable or have highly effective intervention. The four necessary areas in the spectrum of maternal care include a good prenatal care, skilled birth assistance, comprehensive emergency obstetrics care and a good postnatal care.

Keywords: Antenatal care, developing nation, haemorrhage, hypertension, maternal mortality, maternal mortality ratio

Introduction

Maternal mortality, comprehensively defined by the WHO as the death of a women while pregnant or within 42 days of termination of pregnancy irrespective of the site and duration of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes, is an ongoing battle in the developing nations. The highest number of maternal deaths are seen in the Sub-Saharan Africa and the South Asia region. The WHO estimates put the number to as high as approximately 830 mortalities occurring per day due to pregnancy or childbirth related complications [1].

Most of these mortalities are attributable to preventable causes either direct or indirect. Direct causes of maternal mortality include hemorrhage, hypertensive disorders and abortions while indirect causes include hepatitis, heart disease, anemia and respiratory diseases [2]. One of the targets of Sustainable Development Goals between 2016 to 2030 is to decrease maternal mortality to less than 70 per 100,000 live births.

The Indian scenario is one of hope. The overall maternal mortality ratio of India has reduced by 77%, from 556 per 100 000 live births in 1990 to 130 per 100 000 live births in 2016. India's present MMR is above the Millennium Development Goal (MDG) target and puts the country on track to achieve the Sustainable Development Goal (SDG) target of an MMR below 70 by 2030 [3]. This is primarily attributable to numerous policies formulated and implemented by the government of India to combat the burden of the maternal mortality, like Janani Sishu Suraksha Yojana which mitigates the social determinants of health, provides better antenatal care, and encourages free institutional deliveries.

However, there is much more that needs to be done to mitigate the losses due to preventable causes not only by early recognition of associated risk factors but also provision of prompt intervention. This retrospective analysis was performed at our tertiary care hospital with the aims to identify these lacunae.

Objectives

To analyze the causes and risk factors associated with maternal mortalities in Department of Obstetrics and Gynaecology, Kamla Nehru Hospital IGMC Shimla,

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with a further interest in drawing up implementable ways to reduce mortality rates in the future.

Materials and methods

This was a retrospective study carried out in Department of Obstetrics and Gynecology at Kamla Nehru Hospital for Mother and Child, Indira Gandhi Medical College Shimla, Himachal Pradesh, from January 2015 to December 2018. The hospital is a tertiary care center catering to most of the sub centers, primary health centers and district hospitals in the state of Himachal Pradesh.

The required details were collected from the patient case sheets and the maternal death review forms from January 2015 to December 2018. These forms were filled by the attending doctors and were then reviewed by the senior consultants. These were then reviewed by the maternal death review committee with multidisciplinary participation of experts from departments of obstetrics and gynecology, internal medicine, anesthesia and members from department of health and family welfare within ten days of the maternal death. The subsequent report was then submitted to National Health Mission, New Delhi for further evaluation.

Maternal mortality is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management (from direct or indirect obstetric death), but not from accidental or incidental causes [1]. The maternal deaths which met the ICD 10-WHO Criteria for Maternal Death were included in this study. Maternal mortality rate was calculated by the total number of maternal deaths/one lakh live births.

Results

This retrospective study done at the Kamla Nehru Hospital for Mother and Child, IGMC Shimla from January 2015 to December 2018 reports 25,856 live birth and 42 maternal deaths. The epidemiological and the demographic profile of the maternal mortalities was analyzed and it was established that majority of women 45.2% (n=18) were between the age group of 23-25 years, followed by 28.57% (n=12) patients between the age group of 18-22 years. A total of 47.61% (n= 20) patients were multiparous and 42.5% (n=18) were primigravida with a total of 21 (50.0%) patients belonged to lower class and 42.85% (n=18) to middle class and 7.14% (n=3) to upper class (Table 1).

Table 1: Distribution of parity, socio-economic status, booking and referral status.

Parity	No of women (%)
Primigravida	18(42.85%)
Multipara	20(47.61%)
Grandparity	4(9.52%)
Socioeconomic status	
Lower class	21(50.0%)
Middle class	18(42.8%)
Upper class	3(7.2%)
Booking status	
Yes	29(69.10%)
No	13(30.90%)
Referred from other institution	
Yes	30(71.4%)
No	12(29.6%)

According to the WHO, a total of four visits during the entire partum period is considered booked. Our study illustrates that 69.10% (n=29) of the patients were booked with a majority booked at the peripheral health institutes with 71.4% (n=30) referred from various centers for tertiary care (Table 1). A total

of 50% (n=21) of patients were referred from district hospital while 11.9% (n=5) from community health centers. It is notable, however, that almost one-fourth of the patients were unbooked (28.2%, n=11).

Table 2: Correlation between the period of admission and death

At the time of admission	
Antenatal period less than 20 weeks	2(4.7%)
Antenatal period greater than 20 weeks	20(47.6%)
Intrapartum period	7(16.66%)
Postpartum period	13(30.9%)
At the time of death	
Antenatal period	10(23.80%)
Postpartum period	32(76.19%)

As is clearly evident in Table 2, although the majority of the patients were admitted in the antenatal period greater than 20 weeks 47.6% (n=20) the majority of the mortalities occurred in the postpartum period (76.19%, n=32) reflecting the need for a better screening procedure at the first point of contact between the patient and the health system.

In spite of the comprehensive rural health coverage and referral system in Himachal Pradesh, only 33.33%(n=14) of the patients reported to the tertiary care facility within a time span of less than 12 hours while 19.04%(n=8) reached within a span of 12 to 24 hours and 16.67%(n=7) reported within 24 to 48 hours. These observations could be attributable to untimed referrals, poor road conditions or due to improper triaging of the patients at the time of the onset of the complication.

The various causes of death in these 42 patients, categorized according to the WHO-ICD 10, are depicted in table 3 below.

Table 3: Causes of Maternal Mortality

Causes of maternal mortality	No of women (%)
Direct: Obstetric Haemorrhage	5(11.9%)
Direct: Hypertensive Disorders	9(21.4%)
Direct: pregnancy related sepsis	7(16.6%)
Direct: Unexpected complication of management (pulmonary embolism/odema)	3(7.14%)
Indirect : Viral Hepatitis	8 (19.4%)
Indirect : Heart Disease	3(7.14%)
Indirect : Febrile Conditions	4(9.52%)
Venous thrombosis	2(4.7%)
Known medical :quadriplegia*	1(2.3%)

*Ramsay Hunt Syndrome

Out of the 42 mortalities, 24 succumbed to direct causes while 18 succumbed to indirect causes. Amongst the direct causes, a majority suffered hypertensive disorders (n=9, 21.4%) while viral hepatitis (n=8, 19.4%) lead amongst the indirect causes. The maternal mortality ratio during the four years in the study period was 162.43. For each individual year, the MMR is depicted in table no 4.

Table 4: The maternal mortality ratio in various years

Year	Number of deaths	Number of live births	MMR
2015	11	6469	170.04
2016	17	6476	262.50
2017	7	6539	107.05
2018	7	6372	109.85

Discussion

The present maternal mortality ratio of India is around 130/1 Lakh births according to Government of India accounting for around 17% of the total global burden of maternal mortality. Although, there has been progress made in the efforts to decrease maternal mortality over the last decade, India still has a

lot to do to achieve the goal set in the Sustainable Developmental Goals for 2030. In this regard, the maternal mortality ratio is an important indicator for obstetric risk and depicts the trail on the lines of the targets of Millennium Development Goals.

The health department of the state plays a pivotal role in ensuring a target of complete antenatal coverage, good dietary supplementation, oral supplementation for correction of anemia through ground level ASHA workers, promoting institutional deliveries, appropriate referral linkages and attempts at cost free antenatal and postpartum care.

In the present study, the maternal mortality ratio over the four year study period was 162.43/ 1 lakh live births. For each individual year it was 170.04, 262.50, 107.05, 109.85 in 2015, 2016, 2017, 2018 respectively. This although comparable to the national data, doesn't represent the mortality of the state of Himachal Pradesh as a whole since our center is a tertiary care centre with referral facilities for all high risk cases are from the peripheral system.

However, as compared to similar tertiary care facilities, the MMR in our study was comparatively lesser and could be attributed to free antenatal care and good peripheral facilities. (Table 5).

Table 5: Comparison of Maternal Mortality from various institutes across India

Studies	Live births	No of deaths	MMR
Present study	25,856	42	162.43
P Mittal <i>et al.</i>	1,00,631	364	361.71
Sundari <i>et al.</i>	6,976	56	802
Ramola <i>et al.</i>	7,152	48	672.3

A notable spike in MMR of 262.50 in 2016 occurred due to an epidemic of hepatitis E in the district of Shimla, Himachal Pradesh. This alone caused a total of six maternal deaths within two months. In the next three consecutive years, however, continued with the decreasing trend of MMR. Notable amongst this was the MMR of 2018, which at 109.85 is at par with the developed nations [5].

Socio- demographic factors play an important role in maternal mortality. A majority of women belonged to lower socioeconomic status (n=21, 50%) and were between the age of 23 to 25 years (n=18, 45.2%). This was comparable to study conducted by Sundari *et al.* [6] This is illustrative of the fact that educating women of all ages regarding the antenatal and postpartum care will help streamline the need for better outcomes.

In the present study, a maximum number of women were admitted in the antenatal period greater than 20 weeks (47.6%, n=20), followed by 30.9% of patients in their postpartum period however, while a maximum (76.19%, n=32) died in their postpartum period. Maternal outcome in the postpartum period is the direct outcome of antenatal care of the patient. Hence, it becomes imperative to not only identify high-risk patients in the early antenatal period but also plan for their intrapartum and postpartum care.

Classified according to the WHO-ICD 10, the present study had a majority of the patients with hypertensive toxemia (21.40%, n=9), while the rest of the patients had fulminant hepatitis (19.40%, n=8), sepsis (16.60%, n=7), and hemorrhage (11.9%, n=5). The WHO estimates around 25% of maternal deaths in developing nations to be due to hemorrhage which is in contrast to our study⁵. A study conducted by Khandle *et al.* reported preeclampsia and eclampsia in 28.19% and hemorrhage 10.25% which is similar to our study [7].

However, the mortality due to hemorrhage (11.9%) served in our study was comparatively less than observed by Murthy *et al.*

(26.66%) and Rajeshwari *et al.* (35.5%) which could be attributed to availability of round the clock blood bank facility round the clock in the institute [8,9]. The association of anemia in our study was around 56% which reflects the poor and unmet dietary requirements of women.

Overall, in developed countries, direct obstetric causes and indirect causes are implicated in 73% and 27.5% mortalities respectively [9]. While in our study, direct causes attributed to about 57% while the rest were indirect causes. This may indicate a shift towards improved maternal healthcare both due to economic development as well as various public health provisions.

Comprehensive plans for a safe motherhood should include a good prenatal care, skilled birth assistance with good backup of emergency services, comprehensive emergency obstetrics care and a good postnatal care. Provision of these facilities to all women with appropriate sensitization to the process of parturition, positive reinforcement of the requirements of pregnancy care and dedicated health care facilities would result in a definite decline in the maternal deaths with the positive consequence to affect the women, her family, society and the nation as well.

It goes beyond a shadow of a doubt that maternal mortality ratio is a key performance indicator to dictate efforts to improve the health and safety of mothers before, during and after childbirth worldwide. Armed with the knowledge of MMR, the various preventable causes of maternal mortality and their effective intervention, safe motherhood for all is an achievable dream.

The limitation of the study was that type of delays could not be established in our study as verbal autopsy could not be done retrospectively.

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