Original Research Article

Using the new ICD-MM classification system for attribution of cause of maternal death: a retrospective study from a tertiary care hospital of Rajasthan

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ABSTRACT

Background: Sustainable development goal 3 includes an ambitious target of reducing the global maternal mortality rate (MMR) to less than 70 per 100,000 births by 2030. Understanding the causes of and factors contributing to maternal deaths is critically important for development of interventions that reduce the global burden of maternal mortality and morbidity. The International classification of diseases-maternal mortality has proven to be easily applicable and helps clarify the cause of maternal death.
Methods: Retrospective study of 100 maternal death cases was done in a tertiary medical centre of Rajasthan from December 2020 to November 2021 for determining the causes of maternal death and their classification according to ICD-MM.
Results: A total of 100 maternal mortality cases were analyzed in this study for causes of death. Classification of causes of death according to WHO ICD-MM is represented in study results. Direct causes of maternal deaths were observed in 82 % cases whereas indirect causes were present in remaining 18%. Hypertensive disorders (29%), obstetric haemorrhage (27%) and pregnancy related infection (12%) constituted the major groups of direct cause of maternal deaths whereas systemic infections were the most common indirect cause (15%). During the study period, COVID-19 was attributable to 12 cases of maternal death.
Conclusions: Hypertensive disorders (29%), obstetric haemorrhage (27%) and pregnancy related infection (12%) were the major causes of direct obstetric death and systemic infections (15%) was the most common cause of indirect obstetric death. All of these causes are preventable with targeted interventions.

Keywords: ICD-MM, Maternal death classification, Maternal mortality, COVID-19

INTRODUCTION

A maternal death 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 but not from accidental or incidental causes.[1,2]

The definition includes maternal death, based on the cause of the death being either a direct or indirect maternal cause. The WHO application of international classification of diseases-10 (ICD-10) to deaths during pregnancy, childbirth, and the puerperium: international classification of diseases-maternal mortality (ICD-MM) is intended to facilitate the consistent collection, analysis and interpretation of information on maternal deaths.[3]

Sustainable development goal 3 (SDG 3) [4] includes a target of reducing the global maternal mortality rate (MMR) to less than 70 per 100 000 births by 2030 with no country having a maternal mortality greater than 140. To get this target, we have to identify the clinical causes and health system shortfalls to reduce complications and adverse fatal outcome.[4,5] A standardized application of international classification of diseases-10 (ICD-10) of the cause of death attribution will improve interpretation of data on maternal mortality, analysis on the causes of maternal death, and allocation of resources intended to address maternal mortality.[5,6]

Maternal death surveillance and response (MDSR) guidelines recommend that maternal deaths must be classified on the basis of ICD-10.[7,8] With this background the following study was undertaken in our department of obstetrics and gynaecology, RNT Medical college, Udaipur, Rajasthan with the following objectives: to classify the underlying causes of maternal death according to ICD-MM, and to categorize maternal death into direct or indirect obstetric death.

METHODS

Study design, population, location and duration

Current study was a retrospective observational study. The study population comprised of all maternal death of a woman while pregnant or within 42 days of termination of pregnancy in this hospital in 12 months.[1] ICD-MM was used for classification of causes of maternal mortality. A tertiary care hospital of Rajasthan. It has an annual delivery rate of around 15000 and gets a large number of referrals from primary health centers (PHCs), community health centers (CHCs) and district hospitals of southern part of Rajasthan as well as nearby states. Study was conducted from 01 December 2020 to 30 November 2021 for a duration of 12 Months.

Inclusion and exclusion criteria

All cases of maternal death fulfilling the WHO definition of maternal death and having complete data on MDSR form were included in the study. Cases were excluded from the study are maternal death occurring after 42 days after termination of pregnancy, maternal death due to accident, homicide or suicide, and maternal death for which data was incomplete or missing.

Procedure

A total of 100 maternal mortality cases were analyzed in this study for causes of death. Single cause coding was done and underlying cause was determined for each maternal death. Cases were further categorized into direct and indirect obstetric death based on single underlying cause. Contributory causes for each case were also evaluated. All the data was presented as frequencies and percentages as per ICD-MM.[5] No

statistical software required to analyze the data. The definitions of causes of death as per ICD-MM are stated below.[5]

Underlying cause of death

It is defined as the disease or condition that initiated the morbid chain of events leading to death or the circumstances of the accident or violence that produced a fatal injury.

Direct and indirect obstetric deaths

Direct obstetric deaths are those resulting from obstetric complications of the pregnancy state (pregnancy, labor and the puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above. Indirect obstetric deaths are those resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by physiologic effects of pregnancy.[8]

Contributing causes

It may predispose women to death, as either a pre-existing condition or a risk factor.

RESULTS

A total of 100 maternal mortality cases were analyzed in this study for causes of death. Classification of causes of death according to WHO ICD- MM is represented in (Table 1).[5]
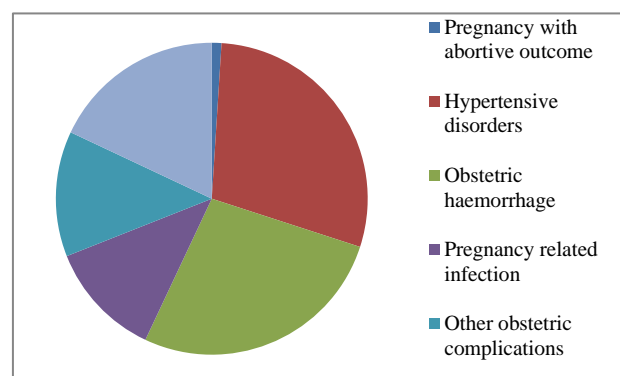

Figure 1: Classification of maternal deaths according to WHO ICD-MM (n=100).

Direct causes of maternal deaths were observed in 82% cases whereas indirect causes were present in remaining 18%. Hypertensive disorders (29%), obstetric haemorrhage (27%) and pregnancy related infection (12%) constituted the major groups of direct cause of maternal deaths whereas systemic infections were the most common indirect cause (15%). During the study period, COVID-19 was attributable to 12 cases of

maternal death. Difficulties were experienced while assigning the underlying cause in presence of multiple causes and also for determining the indirect cause of death. Analysis of the case summary and sequence of

development of complications facilitated identification of one underlying cause according to the ICD-MM for each case of maternal death.

Table 1: Classification of maternal deaths according to WHO ICD-MM (n=100).

Type	Group name (N)	Cases	%
Maternal death: direct	Pregnancy with abortive outcome (1)	1	1
Maternal death: direct	Hypertensive disorders in pregnancy, childbirth and puerperium (2)	29	29
Maternal death: direct	Obstetric haemorrhage (3)	27	27
Maternal death: direct	Pregnancy related infection (4)	12	12
Maternal death: direct	Other obstetric complications (5), DIC (6) + AFE (7)	13	13
Maternal death: direct	Unanticipated complications of management (6)	-	-
Maternal death: indirect	Non obstetric complications (7)	18	18
	Anemia	1	1
	Cardiac disorders	2	2
	Liver disorders	-	-
	Respiratory disorders	-	-
	Neurological disorders	-	-
	Infections/infestations	15	15
	COVID	12	12
	Dengue	2	2
	Cerebral malaria	1	1

DISCUSSION

In the present study, 100 cases were analysed from December 2020 to November 2021 for classification of the underlying causes of maternal death according to ICD-MM[5] and categorization of each maternal death into direct or indirect obstetric death.

Direct causes of maternal mortality were present in 82% cases whereas indirect causes were responsible for remaining 18%. Hypertensive disorders (29%) were the major direct cause of maternal death which is similar to the earlier study by Mittal et al (28.02%).[6-8] Obstetric haemorrhage (27%) and pregnancy related infection (12%) constituted the major groups of direct cause of maternal deaths whereas systemic infections were the most common indirect cause (15%). This study highlights importance of maternal death review from unusual causes such as observed during pandemic. During the study period, 12 cases of maternal death with COVID-19 were noted and the recent WHO guidelines for coding of COVID-19 as a cause of death was used to assign the underlying cause and contributory cause.[5] It is important to have a audit on maternal deaths and more important is identifying actions to improve care, implementing those actions and monitoring the impact on maternal death. [9,11] Hypertensive disorders, obstetric haemorrhage, sepsis and anaemia are preventable causes of maternal death. Strategies towards ending preventable maternal mortality is based on preventive and primary reproductive health care services, comprehensive sexuality education, family planning and contraception as well as adequate care during pregnancy, childbirth and the postpartum period.[10,12] Present study is a retrospective hospital-based study with a small sample (n=100) therefore the results

could not be generalized. Despite this limitation, it provides insight on classification of maternal deaths into direct and indirect obstetric deaths based on underlying causes. This study also highlights importance of maternal death review from unusual causes such as COVID-19.

CONCLUSION

Hypertensive disorders (29%), obstetric haemorrhage (27%) and pregnancy related infection (12%) were the major causes of direct obstetric death and systemic infections (15%) was the most common cause of indirect obstetric death. All of these causes are preventable with targeted interventions. Reducing maternal mortality is one of the key targets within the SDGs and ICD-MM is a valuable tool for uniform and standard classification of maternal deaths as well as for developing strategies for reducing maternal death.

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