

Research

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The Three Delays of Maternal Mortality in a Public-Sector Tertiary Teaching Hospital: Is There a Paradigm Shift?

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ABSTRACT

Objective: To describe the three delays of maternal mortality in a public-sector tertiary teaching hospital in one year.

Study Design: Retrospective, observational study.

Place and Duration of Study: Minia Maternity & Children's University Hospital, Department of Obstetrics and Gynaecology, Unit A, El Minya city, Egypt, from January 2014 to December 2014.

Methodology: 8915 of deliveries during the study period were reviewed and all causes of maternal deaths were analysed. Data regarding age, parity, sociodemographic characteristics, booking status, referral source, cause of death and the three delays was collected on structured proformas, analysed by the statistical software, SPSS version 16, and presented in the form of frequencies and percentages.

Results: The projected maternal mortality ratio was 89.7/100,000 live births. The mean age of women was 23±7.2 years and median parity was 4 (ranging from 0-11). 4 cases (50%) of the women had received no formal education and 5(62.5%) belonged to a lower socioeconomic class. Two cases (25%) of the women received no antenatal care while four cases (50%) received less than four antenatal visits during the whole pregnancy and classified as poor antenatal care attendee.

Direct causes were responsible for 62.5% of maternal deaths, 37.5% of deaths were due to indirect causes.

The third delay was found to be the most frequent (79%) followed by the first delay (71%) while the least one was the second delay (40%).

Conclusion: There is a paradigm shift of delays toward the third delay rather than the first or second delays which might be related to chronically under-resourced health facilities which are still unable to cope effectively with serious obstetric complications. Better understanding of the third delay co-factors could lead to significant improvement in the quality of care in our communities.

KEYWORDS: Maternal mortality; Three; Delays; Developing countries; Socio-demographic characteristic.

ABBREVIATIONS: MMR: Maternal Mortality Ratio; MDG: Millennium Development Goal; WHO: World Health Organisation.

INTRODUCTION

The Maternal Mortality Ratio (MMR) is considered as a sensitive indicator to many

parameters like adequacy and quality of Healthcare of women, access to care, as well as the Women's status.¹ In the developing countries, one woman dies in 16 compared to 1 to 2800 in the high income countries² and most of such deaths due to pregnancy complications are preventable.³

The lag to achieve the targeted MMRs of the Millennium Development Goal (MDG)5, mostly is not due to absence of effective and evidence based interventions for such problems but due to difficulty to access timely to existing, emergency obstetric interventions which could avert 88%-98% of the maternal deaths as World Health Organisation (WHO) estimated in the Mother-Baby Package: Implementing Safe Motherhood in 1994.

According to the official reports of the Egyptian ministry of health, Egypt has maternal mortality ratio 52.5/100.000 in 2013 which means that Egypt is on the right track to achieve the target figure of the MDG5 by 2015. Extensive analysis of the causes of maternal mortality has resulted in five main causes are haemorrhage, obstructed labour, preeclampsia and eclampsia (pregnancy induced hypertension), sepsis and complications of unsafe abortion.⁴

However, these causes may not result directly in maternal deaths, but through other factors like delay in receiving timely and appropriate care in the event of a pregnancy complication. Such delays have been put forward as a major determinant in maternal mortality.

In 1994, Thaddeus and Maine proposed these delays into three types: three different levels:

1. Delay in decision to seek care,
2. Delay in reaching the appropriate facility and
3. Delay in receiving adequate care in the facility.⁵

There are many factors that can contribute to each delay.

In developing countries, poor economic condition usually contributes to low educational status; poor infra-structures in the health facilities, and may also reflected on the qualification and skills of the health professionals in such countries. This means contribution to the three delays together as major determinants in maternal mortality.

This study describe analysis of the maternal mortality in a public-sector tertiary teaching hospital in one year in relation to the three delays characteristics and does the contribution of each delay has different pattern than the other.

METHODOLOGY

This retrospective, observational study was undertaken in the Department of Obstetrics and Gynaecology, Minia Maternity & Children University Hospital, Egypt where the cases

of maternal mortality within the hospital were studied from January 2014 to December 2014. The health facility is the only public-sector tertiary teaching University Hospital in El Minya governorate, Egypt that serves as a referral centre for all the health facilities of nine general hospitals in nine big cities and its suburbs as well as the adjoining areas of rural territories distributed along 160 kilometres.

Majority of the women admitted to the reception sector were emergency cases referred by various public or private hospitals, in a critical condition. All women who suffered a maternal death during the year of 2014 were included in the study. We used a structured proforma to collect the relevant information including means of both interviewing the relatives of the deceased women, doctors attended with the cases as well as from the patients' case files. Data was collected regarding age, parity, socio-demographic characteristics, booking status, referral source, cause of death and the analysis of the three delays according to Thaddeus and Maine.⁵ Information regarding the first and second delay was obtained from interviews with patients' attendants while information regarding the third delay was taken from the case files and after the interviewing the health team who involved in the care provided. The delay in referral from various health facilities and multiple referrals were included in the second delay.

Booking was defined as those patients who were registered at any health facility which distributed alongside the governorate.

The data was analysed by computer software, SPSS version 16, and results presented as frequencies and percentages.

RESULTS

During the study period, there were 8915 deliveries, 9347 live births and 8 maternal deaths giving a maternal mortality ratio of 89.7 per 100,000 live births. Six women (75%) were booked in different health facilities. All women (100%) were referred, five cases (62.5%) from private hospitals, two (25%) from public hospitals, one case (12.5%) from maternity home. The mean age of women was 23±7.2 years and median parity was 4 (ranging from 0-11). The mean haemoglobin concentration was 7.2±2.8 gm/dl. At time of admission, the median time interval between admission and death was 28 hours. Five women died within 24 hours of admission, two were dead on arrival and one died within two hours.

Four cases (50%) of the women had received no formal education and 5(62.5%) belonged to a lower socioeconomic class. Two cases (25%) of the women received no antenatal care whatsoever throughout the index pregnancy and classified as non-attende while four cases (50%) received less than four antenatal visits during the whole pregnancy and classified as poor antenatal care attendee.

Direct causes were responsible for 62.5% of maternal deaths, the two most frequent being haemorrhage and hypertensive disorders.

Three cases (37.3%) of deaths were due to indirect causes, one case thromboembolism, one cardiac case and one case had breast cancer (Table 1).

Direct (5) (62.5%)	Indirect (3) (37.2%)	Accidental
Haemorrhage 3(37.5%)	Thromboembolism 1(12.5%)	No recorded cases
Hypertensive disorders 1(12.5%)	Cardiac disease 1(12.5%)	
Puerperal sepsis 1(12.5%)	Breast cancer 1(12.5%)	

Table 1: Causes of maternal deaths. Values are expressed as n(%).

Analysis of the reasons for the three delays of MM can be shown in Table 2. The third delay was found to be the most frequent (79%) followed by the first delay (71%) while the least one was the second delay (40%).

DISCUSSION

The projected maternal mortality ratio during the study period (89.7/100,000 live births) was markedly lower compared to that previously reported during the past eight years from the same Unit for the years 2007-2013 (in 2007 was 183.8, in 2008 was 165.9, in 2009 was 166.3, in 2010 was 117.6, in 2011 was 162.4, in 2012 was 90.7 and in 2013 was 94.3937 per 100,000 live births).

The plausible reasons for this discrepancy could be due

to improving in the referral system between the general hospitals in the governorate and the tertiary one after initiation of the referral awareness program over the past two years period from 2012-2013, improved communication tools between the health physicians in the area, initiation of standard protocols, application of the auditing standards, improved reporting of the incidents and increased staff serving in the hospital since 2012.

The recorded MMR in the tertiary units were variable; a previous study from Karachi in Pakistan reported hospital-based MMR as varying from 17 deaths in a private tertiary hospital to 2,736 deaths in a public-sector tertiary hospital.⁶

In agreement with a systematic review, conducted by WHO, demonstrating haemorrhage and hypertensive disorders as the major contributors to maternal deaths in developing countries,⁷ Haemorrhage was the leading causes of direct maternal deaths in this study.

Also we had three cases of indirect cause of MM were thromboembolism, cardiac, and breast cancer seems to be an important cause of indirect maternal deaths and needs further investigation.

During the study period the causes of death among the women who were brought dead did not mentioned as the cases were not initially admitted into the hospital as they not registered in the hospital files where the diagnosis of death were made in the reception room, however the interview with the relatives and persons who attended with the cases revealed the following causes, haemorrhage in two patients and ruptured uterus, pre-eclamp-

	First delay	Second delay	Third delay
1 st case of Haemorrhage	Lack of awareness Fear of being ill-treated in the health facility	Long distance Late referral Multiple referrals Transport	Delay in getting blood Delay in surgery Substandard care
2 nd case of Haemorrhage	Lack of awareness	Long distance Late referral	Failure of communications non-availability of blood in general hospitals
3 rd case of Haemorrhage	Lack of awareness	Long distance Late referral Multiple referrals	Delay in getting blood Delay in surgery
Hypertensive disorders (preeclampsia and eclampsia)	Lack of awareness No available person to take care of the Children.	Long distance Late referral Multiple referrals	Delay in surgery Substandard care
Puerperal sepsis	Lack of awareness	Late referral	Failure of communications
Thromboembolism	Lack of awareness	Long distance Multiple referrals	Lack of agreed protocol Substandard care
Cardiac disease	Lack of finances	Long distance Late referral Transport	Failure of communications Lack of agreed protocol Substandard care
Breast cancer	Lack of finances Lack of companion in going to the health facility	Long distance Multiple referrals	Failure of communications Substandard care

Table 2: Relations between the cause of death and the three delays. Values are given as n(%).

sia, induced abortion and puerperal sepsis in one woman each.

There is a positive relation between the literacy levels and the maternal morbidity and mortality and irrespective of sociocultural and demographic aspects, Poverty has also been strongly linked to the use of maternal health services, with the poor using fewer services than the rich.⁸ The formal maternal education have been found a significant predictor of accessing the maternity service and their decision to deliver in a health institution.⁹ In our study 50% of cases had received no formal education. In another study, the researchers reported odds ratio of 0.30 (0.21-0.44) for maternal mortality for more than eight years of schooling compared with no schooling.¹⁰

Our results showed that 5 cases (62.5%) belonged to a lower socioeconomic class which confirms the results of a study that confirmed that the most of maternal deaths occur in poor countries and poor women have the least access to skilled birth attendants.¹¹ Another study from Nigeria concluded that 80% of mothers, who died in relation to pregnancy, belonged to the lower socio-economic class.¹²

The reported very high maternal mortality from public and tertiary hospitals (including ours) could be explained on the basis the large number of unbooked cases, referred in a critical condition, failure of communications between the health professionals in different hospitals, lack of agreed protocols and non-availability of blood in general hospitals.

In an agreement with a study which concluded that 88% maternal mortality among the unbooked patients compared to 11% among the booked,¹³ the majority of women in this study did not have proper antenatal care during the index pregnancy where 2 cases (255) had no ANC and 4 cases (50%) had less than 4 antenatal visits and classified as poor attendee.

A study from Nigeria reported frequency of delay to be associated with 78% of maternal deaths. They found the first delay to be the most frequent (57%).¹⁴ In our study, all cases had multiple delays and The third delay was found to be the most frequent (79%) followed by the first delay (71%) while the least one was the second delay (40%). Similar results were obtained from a facility based audit in Tigray, Ethiopia, 88% of the maternal deaths could be attributed to medical failures.¹⁵

Another hospital-based case control study of maternal mortality in Southern Nigeria, revealed that the most striking difference between the [maternal mortality and control] groups was in the third delay.¹⁶

Also, in a district-based audit in Indonesia, 60% of maternal deaths were attributed to third delay.¹⁷

The findings of these studies are supported by the WHO Health Report in 2005, which concluded that accessing good obstetric care could prevent 50-70% of global maternal deaths and

substantially reduce the number of women living with sequelae of obstetric complications.¹⁸

The most common reason for the first delay was lack of awareness about the seriousness of the disease followed by financial problems, Fear of being ill-treated in the health facility or Lack of companion in going to the health facility. The second delay was mostly due to long distance (a high number of patients came from El Edwa or Malway cities where it can take upto three to four hours to reach the tertiary unit) followed by late referral from the different health facilities as well as time lag between the health facilities.

Also multiple referrals were also a significant factor in some patients who were referred to our hospital after having been to a number of different hospitals either private or general after being also delayed at home.

In our study, the most frequent reason for the third delay was the substandard care in the form of lack of agreed protocols in different settings, poor communications inside and between hospitals followed by difficulty in getting blood, which is usually attributed to donors not being available. This were followed by delay in surgical intervention, the usual reasons for which are delay in investigations and diagnosis.

This study is the first study from a large tertiary care hospital of Egypt which serves about eight million populations and has a rate of delivery from 12.000-15.000 per year, which has documented the reasons for the three delays of maternal mortality. Further studies are urgently required based on the whole governorate. The results of which could provide the policy makers and healthcare authorities with a useful data to plan appropriate interventions for reduction of maternal mortality.

However, this study was limited by a short period of time of one year and non-availability of control group that could have helped in statistically comparing the socio-demographic characteristics and the frequency of delays between mothers who died and those who lived.

CONCLUSION

Although there is a significant improvement in the MMR during the study period, still high MMR in this study suggests poor access of women to quality healthcare services. Although, the “three delays rarely operate in isolation, they indeed are likely to be interactive and multiplicative. However, there is a paradigm shift of delays toward the third delay rather than the first or second delays, which might be related to chronically under-resourced health facilities which are still unable to cope effectively with serious obstetric complications. Better understanding of the third delay co-factors could lead to significant improvement in the quality of care in our communities.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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