

RESEARCH

Audit of Maternal Mortality Ratio and Causes of Maternal Deaths in the Largest Maternity Hospital in Cairo, Egypt (Kasr Al Aini) in 2008 and 2009; Lessons Learned

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Abstract

This study examined maternal deaths at Cairo University Maternity Hospital between January 2008 and December 2009. The aim was to calculate Maternal Mortality Ratio (MMR) as well as identify the causes and predisposing factors to maternal deaths. Data were collected from the files of the hospitalized pregnant women in the hospital. There were 38 maternal deaths and MMR was 79 per 100,000 live births for the two years examined. The main causes of death were obstetric hemorrhage, hypertensive disorders of pregnancy and cardiac arrest. Substandard medical care and the delay in seeking of medical advice were two contributing factors to maternal deaths recorded. The need for audit and publication of all obstetric hospitals MMR to compare and identify areas of improvements is recommended. (*Afr J Reprod Health 2013; 17[3]: 105-109*).

Résumé

Cette étude a examiné les décès maternels au Centre Hospitalier de la maternité au Caire entre janvier 2008 et décembre 2009. L'objectif était de calculer les taux de mortalité maternelle (TMM) ainsi que d'identifier les causes et les facteurs prédisposant à la mortalité maternelle. Les données ont été recueillies à partir des dossiers des femmes enceintes hospitalisées à l'hôpital. Il y a eu 38 décès maternels et TMM était de 79 pour 100,000 naissances vivantes pour les deux années étudiées. Les principales causes de décès étaient l'hémorragie obstétricale, les troubles hypertensifs de la grossesse et l'arrêt cardiaque. Les soins médicaux de qualité inférieure et le retard dans la recherche de conseils médicaux étaient deux facteurs qui contribuent aux décès maternels enregistrés. Nous préconisons la vérification et la publication de tous les TMM des hôpitaux obstétriques pour permettre d'identifier les domaines qui méritent d'être améliorés. (*Afr J Reprod Health 2013; 17[3]: 105-109*).

Keywords: Maternal Mortality; Cairo University

Introduction

Maternal mortality (or death) is defined as, "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or the site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes". According to the World Health Organization, Maternal mortality is classified as either; (i) direct death when it is associated with or resulting from any treatment received during obstetric complications during pregnancy, labor or puerperium (6 weeks) or (ii) indirect death if

associated with a disorder, the effect of which is aggravated by pregnancy. Late death occur ≥ 42 days after the end of pregnancy². Maternal Mortality Ratio (MMR) is the "number of women died while pregnant or within 42 days of termination of pregnancy per 100,000 live births"¹.

Egypt's National Maternal Mortality Study 1992/93 (ENMMS 1992/93) estimated an overall maternal mortality ratio (MMR) of 174/100,000. The main causes of death were postpartum hemorrhage (25%), hypertensive diseases (16%), antepartum hemorrhage (8%), and puerperal sepsis

(8%) and rupture uterus (7%). Substandard care on the side of health care provider (59%) and delays in seeking medical care on the side of the woman and her family (42%) were two main avoidable factor of maternal mortality³. Maternal mortality decreased 84/100,000 by year 200, and was still with the same main cause of maternal mortality. The substantial improvements were caused by better antenatal care, increase in hospital delivery and improvement in blood transfusion facilities⁴. According to a publication by the Ministry of Planning (2004), the MMR ratio was expected decrease to 43/100,000 in 2008 as healthcare services continue to improve⁵.

Ninety nine (99%) of maternal deaths occur in developing countries and continues to be a major public health issue⁶. It is estimated that worldwide about 500,000 mothers dies every year or 1600 maternal death per day or about one maternal mortality per minute. Postpartum hemorrhage, eclampsia and sepsis are the leading causes for maternal deaths in the developing countries. It is also estimated that 100,000-200,00 death are related to poorly performed or illegal abortions. Twenty Six percent is estimated to be preventable by introducing antenatal, community-based interventions. Access to quality, essential obstetrical care can prevent another 48% of maternal deaths. It is cost-effective to invest in policies that decrease maternal mortality in the most efficient manner possible⁷.

Methods

This study was conducted in Cairo University Faculty of Medicine (called in Arabic Kasr Al Aini School of medicine - which is the oldest and largest school of medicine in Egypt. The hospital

is a tertiary care University Hospital created in 1827 and was moved to its current location in 1837. At the present time, the Faculty of Medicine includes around 37 departments, 42 specialized units, 2773 faculty members, 9423 undergraduate students, and 3732 post graduate students. Each year, more than 40,000 women are treated at the maternity hospital both as outpatient and inpatients.

This retrospective observational study was conducted in the facility from January 2008 to end of December 2009. The aim was to calculate Maternal Mortality Ratio (MMR); identify causes as well as identifying the avoidable causes and predisposing factors. Data was collected from the files of the pregnant women's admitted to the emergency department. Inclusion criteria were death of a pregnant female while she is pregnant or within 42 days from giving birth divided by 100,000 live births (after adjustment) for the years of study.

Records of patients were carefully examined (three times by the three authors to minimize inter-personal variability) and MMR was measured by dividing the number of maternal deaths to 100,000 live births (adjusted) in the period of study. Data of the study were compared and analyzed with Microsoft Excel and Arcus Quick Stat version I.

Results

Of the 49,838 pregnant women admitted to Kasr Al-Ainy Maternity Hospital from 01 January 2008 to end of December 2009, there were 48,055 live births. There were 17 and 21 maternal deaths in the first and second year, respectively. Table 1 shows the total number of admissions in each year with maternal deaths and MMR.

Table 1: Total obstetric admissions, live births, number of maternal deaths and MMR in 2008 and 2009

Year	Total Obstetric Admissions	Total Live Births	Number of Maternal Deaths	MMR (adjusted to 100,000 lives births)
2008	24,389	23,185	17	73
2009	25,449	24,870	21	84
Total/Average	49,838	48,055	38	79

Table 2: Causes of maternal mortality and its numbers (percentage) during the study period

Causes of maternal mortality	Number (Percent %)	
	2008	2009
A. Direct Causes		
1. Obstetric haemorrhage	6 (35.3%)	7 (33.3%)
Postpartum	4 (23.5%)	6 (28.6%)
Antepartum	2 (11.8%)	1 (4.8%)
2. Hypertensive disorders of pregnancy (Cerebral hemorrhage; or Cardiopulmonary failure)	4 (23.5%)	3 (14.3%)
3. Cardiac arrest	2 (11.8%)	4 (19.3%)
4. Septic shock	1 (5.9%)	0
5. Rupture Uterus	0	1 (4.8%)
6. Ectopic pregnancy	1 (5.9%)	0
7. Amniotic fluid embolism	1 (5.9%)	2 (9.5%)
Total direct causes	15 (88.2%)	17 (81%)
B. Indirect Causes		
1. Cardiac diseases	1 (5.9%)	2 (9.5%)
2. Hepatitis	0	1 (4.8%)
3. Blood disorders	1 (5.9%)	0
4. Respiratory Diseases causing respiratory failure	0	1 (4.8%)
Total indirect causes	2 (11.8%)	4 (19%)
Total maternal deaths	17	21

As seen from Table 2, the highest number of maternal deaths occurred in women who were 20 years or less in age and these was associated with multiparity. The proportion of the mothers that were delivered outside Kasr Al Aini was 35.3% in 2008 and 38.1% in 2009 and most cases (58.8% in 2008 and 61.9% in 2009) were associated with vaginal delivery.

The main cause of death in the two years examined were uncontrolled obstetric hemorrhage accounting for 35.3% and 33.3% for 2008 and 2009, respectively. This was followed by hypertensive disorders of pregnancy which accounted for 23.5% and 14.3% in the two years, respectively (Table 3).

Table 3: Age and parity of maternal mortality cases

Age groups	Number (percentage %)	
	2008	2009
20 years or less	4 (23.5%)	5 (23.8%)
21-25 years	2 (11.8%)	3 (14.3%)
26 – 30ys	3 (17.6 %)	2 (9.5%)
31 – 35ys	3 (17.6 %)	3 (14.3%)
36 – 40ys	3 (17.6 %)	4 (19%)

40years or above	2 (11.8%)	4 (19%)
Gravidity and Parity		
G1, P 0+0	3 (17.6 %)	2 (9.5%)
G2, P 1+0	4 (23.5%)	5 (23.8%)
G3, P 1+1	5 (29.4%)	6 (28.6%)
G 4, P 3+0	2 (11.8%)	4 (19%)
5th Gravida or more	3 (17.6 %)	4 (19%)

Table 4: Place and mode of delivery for cases of maternal death 2008-2009

	2008	2009
	Place of Delivery	
Kasr Al-Ainy	11 (64.7%)	13 (61.9%)
Private Hospital	5 (29.4%)	6 (28.6%)
Home	1 (5.9%)	2 (9.5%)
Mode of Delivery		
NVD	10 (58.8%)	13 (61.9%)
C.S	7 (41.2%)	8 (38.1%)

Discussion

A report published in 2005 by the World Health Organization showed that 99% of maternal deaths took place in the developing countries and the maternal mortality ratio in the developing countries is 450 maternal deaths per 100,000 live births. The same report also found that the four

main causes of maternal deaths were: obstetric hemorrhage (mainly post-partum hemorrhage), infections, hypertensive disorders and obstructed labor. Further, it was found that women also die from poor nutritional status at conception and the substandard care provided to them⁸.

The results of this study found that Maternal Mortality Ratio averaged 79 per 100,000 live births in the two years examined. This was similar to the Egypt's reported MMR of 84/100,000⁴. Although Kasr Al Aini is a tertiary referral center with higher risk cases, this MMR was attributable to increased man power and improvement in facilities since much lower ratio would have been observed. For example, the improved facilities included additional three running rooms with a minimum of five junior obstetricians working daily under supervision of mid senior and senior staff members, availability of an ultrasound machine, establishment of an intensive care unit with 8 beds that have been equipped with all facilities with intensive monitoring, as well as availability of highly skilled nurses and residents providing 24 hours service.

The study also found that the main cause of death was uncontrolled obstetric hemorrhage which was similar to that earlier reported in a study by Khan et al in 2006; however, the hypertensive disorders found in our study represented the highest cause of death in Latin America and in the Caribbean. Within regions, there was also some significant variability. For example, within the South American continent, Peru had the highest incidence of maternal death from hemorrhage whereas in the Asia continent, China, Afghanistan and Iran had the highest incidence. In the African continent, Egypt, Senegal and Zambia were the highest. In Europe, Poland had the highest maternal death ratio from hemorrhage⁷.

The third most common cause of maternal mortality in this study (cardiac arrest) was likely that due to lack of routine postmortem examination for all cases of mortality which may be resulting from family refusal of postmortem examinations for cultural reasons. In addition, conducting post mortem examination is not a common practice in Egypt. The common thinking

is that conducting such an examination will delay burial services which are not acceptable. Thus, cardiac arrest is commonly used as an explanation for death in the absence of an obvious cause. Some of those maternal deaths diagnosed as cardiac arrest may have been caused by pulmonary embolism or amniotic fluid embolism.

During the study, there were avoidable factors that likely contributed to maternal deaths. There were inadequate supplies and drugs as well as difficulties in communication between departments involved in the management e.g. the intensive care unit (ICU), anesthesia and blood bank. This was reflected in the time between admission and the start of blood transfusion. We were not able to precisely note these factors due to the quality of medical records even though several hours that lapsed between presentation to Kasr Al Aini and the time of starting blood transfusion or Caesarean section was apparent. Another factor was the high percent of cases transferred from the other public or private sector clinics that could be far away, as well as a number of cases that was delivered at home.

The cesarean section rate for maternal death ratios was around 40% which was noticeable. This may partly be due to the already high ratio of caesarean sections in Kasr Al Aini⁹. The subject of caesarean section rates in Kasr Al Aini is an area that should be examined further.

In Egypt it is generally challenging to measure maternal mortality ratio at a catchment area level. A limitation is not having in place a primary care system which ensures following up cases, reporting and archiving after discharge. Further, there is no computerized system which ensures all information is registered and is easily accessible. However, improvements have been made in reporting of maternal deaths and establishment of maternal mortality surveillance systems in Kasr Al Aini. However, there is still a room for an improvement of medical recording system and requiring senior staff to sign off on the medical notes of maternal mortality cases. A review committee was established at the Departmental level for the analysis and discussion of any maternal mortality and also for building up strategies for prevention of avoidable factors of

maternal mortality. All the above factors have led to significantly decrease the maternal mortality ratio.

In conclusion, maternal mortality ratio in Kasr Al-Ainy Maternity hospital was comparable to Egypt's national average. The World Bank¹⁰ has recently reemphasized the importance of periodic maternal audits and review of maternal deaths – similar to this effort- at the facilities' level. The need to have in place periodic drills for the management of obstetric hemorrhage, training of junior staff members, periodic auditing of medical records, stricter liaison with senior anesthetist in managing and discussing maternal mortality cases and reports as well as application of evidence based guidelines and protocols for management of all obstetric emergencies recommended.

Contribution of Authors

The three authors designed; collected and analyzed the data and key also prepared the manuscript. All authors mentioned in the article approved the manuscript.

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